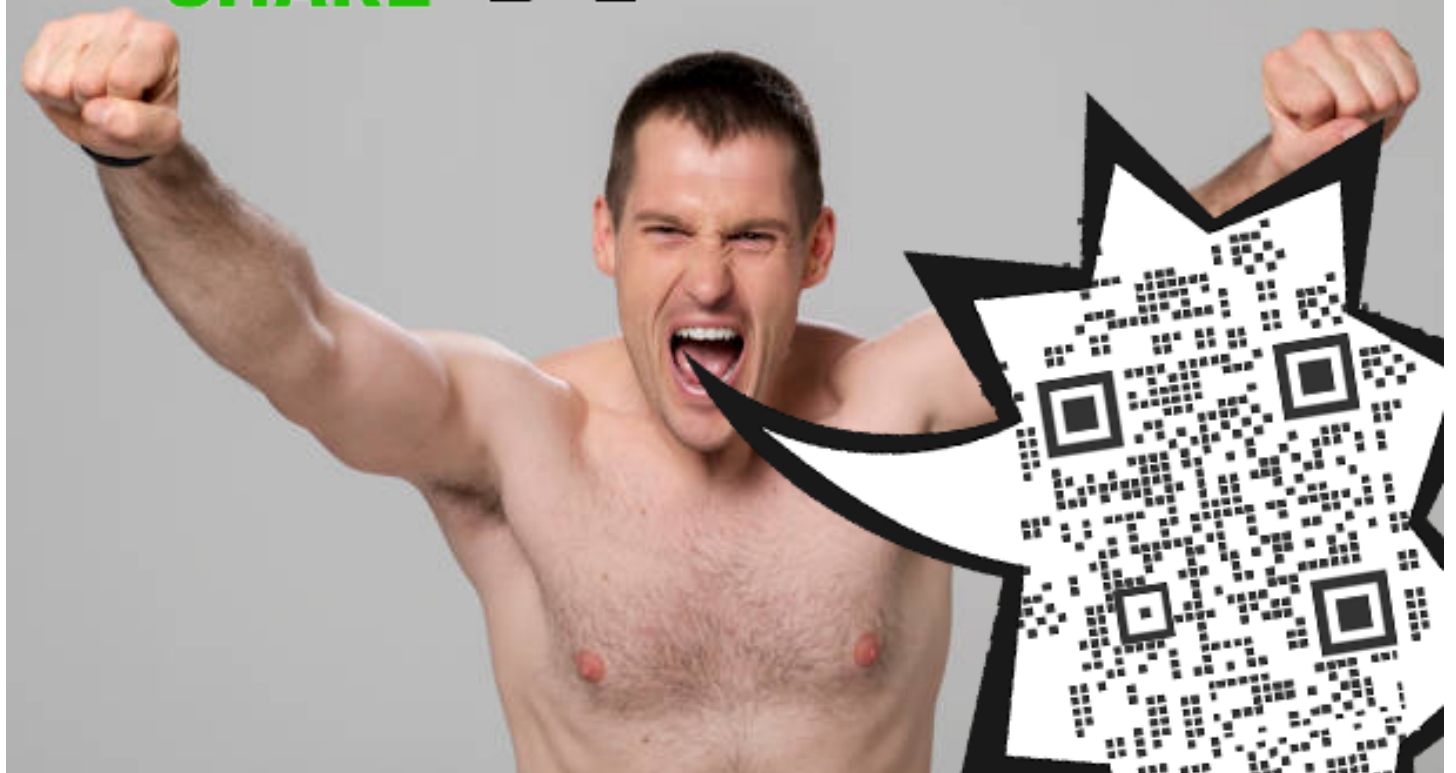


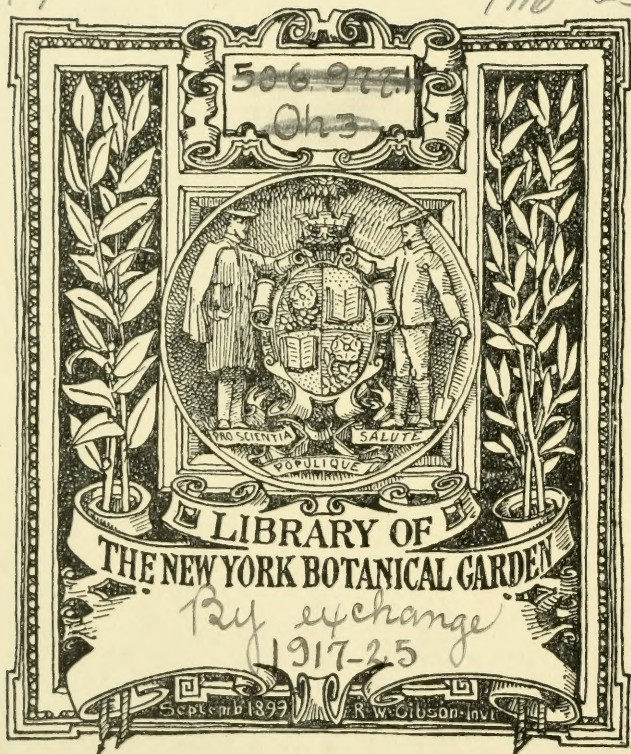
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1916-25



PROCEEDINGS
OF THE
OHIO
ACADEMY OF SCIENCE

VOLUME VII, PART ONE

Annual Report
Twenty-sixth Meeting

ANNUAL REPORT

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Twenty-sixth Meeting

1916

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Date of Publication, January, 26, 1917

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1916-25

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'14. SEYMOUR, RAYMOND JESSE, *Physiology, Botany*,
Dept. Physiology, O. S. U., Columbus
'12. SHADLE, ALBERT, *Zoology*...Zool. Laboratory, Cornell Univ., Ithaca, N. Y.
'11. SHARP, MRS. KATHERINE DOORIS, *Botany, Geology*.....London
'08. SHATZER, C. G.....25 E. Cecil St., Springfield
'08. SHAW, N. E., *Entomology*.....State House, Columbus
'15. SHETRONE, H. C., *Archeology*...Museum and Library Building, Columbus
'13. SHIDLER, W. H., *Geology*.....Oxford
'10. SHILLIDAY, C. L., *Zoology*.....University of Buffalo, Buffalo, N. Y.
'15. SHUMAN, S. C., *Botany*.....Quaker City
'13. SHUMAN, W. L., *Botany*.....Chicago Junction
'09. SIM, ROBERT J., *Ornithology, Zoology*.....Jefferson
'12. SMITH, ALPHEUS W., *Physics*.....O. S. U., Columbus
'08. SMITH, ARTHUR L., *Geology*.....Valley Crossing
'05. SMITH, G. D., *Botany, Zoology*.....Richmond, Ky.
'02. SMITH, J. WARREN, *Meteorology*...U. S. Weather Bureau, Washington, D. C.
'14. SMITH, ROGER C., *Entomology*.....Dept. Zoology, O. S. U., Columbus
'02. SNYDER, F. D., *Zoology, Ethnology*.....Ashtabula
'12. SPECKMAN, W. N., *Geology*.....Baldwin-Wallace College, Berea
'12. STANLEY, CLYDE M., *Zoology*.....High School, Alliance
'05. STAUFFER, CLINTON R., *Geology*....Univ. of Minnesota, Minneapolis, Minn.
'16. STEHLE, MABEL E., *Zoology, Entomology*.....100 Mithoff St., Columbus
'94. STERKI, VICTOR, *Conchology, Botany*.....New Philadelphia
'13. STETSON, R. H., *Psychology*.....Oberlin College, Oberlin
'03. STICKNEY, M. E., *Botany*.....Granville
'15. STOUT, HARRY O., *Botany, Geology, Agriculture, Zoology*,
1031 Alger St., Fremont
'08. STOUT, W. E., *Chemistry, Ceramics, Geology*....40 E. Lane Ave., Columbus
'09. STOVER, W. GARFIELD, *Botany*.....O. S. U., Columbus
'03. SWEEZEY, OTTO H.....Twelfth Ave., Honolulu, Hawaii

- '14. THAYER, WARREN N., *Geology*.....Ohio Mechanics Institute, Cincinnati
- '15. THOMAS, ROY C., *Botany, Zoology, Geology*.....R. F. D. 5, Mt. Gilead
- '13. THOMPSON, LAWRENCE J., *Biology, Chemistry*..21 University Ave., Delaware
- '94. TODD, JOSEPH H., *Geology, Archeology*.....Christmas Knoll, Wooster
- '15. TRANSEAU, EDGAR N., *Botany*.....O. S. U., Columbus
- '15. TROTT, T. ELMER, *Mathematics, Astronomy*..2221 Ridgewood Ave., Alliance
- '12. TURNER, CLARENCE L., *Zoology*.....105 Campbell St., Delaware
- '12. UNNEWEHR, EMROY C., *Physics*.....Baldwin-Wallace College, Berea
- '15. VAN CLEVE, M. R., *Physical Geography, Botany*,
Morrison R. Waite H. S., Toledo
- '14. VERWIEBE, WALTER A., *Geology*.....Orton Hall, O. S. U., Columbus
- '15. VIVIAN, ALFRED, *Agriculture, Chemistry*.....O. S. U., Columbus
- '04. WAITE, F. C., *Anatomy, Zoology*....Western Reserve University, Cleveland
- '02. WALTON, L. B., *Biology*.....Gambier
- '16. WARREN, JAMES H., *Anatomy*...Medical College, North Park St., Columbus
- '98. WEBB, R. J., *Botany*.....Garrettsville
- '11. WELLS, B. W., *Botany*.....Dept. Botany, Univ. of Chicago
- '13. WELLS, G. R., *Psychology*.....Oberlin College, Oberlin
- '96. WERTHNER, WILLIAM B., *Botany*.....Steele High School, Dayton
- '01. WESTGATE, LEWIS G., *Geology*.....Delaware
- '16. WESTON, WILLIAM H., JR., *Botany, Zoology*,
Federal Hort. Board, Washington, D. C.
- '15. WILLIAMS, JOHN N., *Mathematics, Physics, Chemistry*,
227 W. Reynolds St., Urbana
- '13. WILLIAMS, SAMUEL R., *Physics*.....Oberlin College, Oberlin
- '03. WILLIAMS, STEPHEN R., *Biology*.....Miami University, Oxford
- '97. WILLIAMSON, E. B., *Entomology*.....Bluffton, Ind.
- '08. WILSON, STELLA S., *Geography, Geology*...97 N. Twentieth St., Columbus
- '14. WILTBERGER, P. B., *Entomology, Zoology*....Univ. of Maine, Orono, Maine
- '15. WITHROW, JAMES R., *Chemistry, Mineralogy*.....O. S. U., Columbus
- '92. WRIGHT, G. FREDERICK, *Geology*.....Oberlin
- '15. WYKOFF, HARRY S., *Biology, Botany*.....Station A, No. 4, Alliance
- '03. YORK, HARLAN H., *Botany*.....Brown Univ., Providence, R. I.
- '15. YOST, RALPH, *Genetics, Botany, Bacteriology*.....Box 81, Thornville
- '06. YOUNG, R. A., *Botany*.....Dept. of Agriculture, Washington, D. C.

Total Membership—268.

REPORT

OF THE

TWENTY-SIXTH ANNUAL MEETING

OF

THE OHIO ACADEMY OF SCIENCE

The Twenty-sixth Annual Meeting of the Ohio Academy of Science was held at Ohio State University, Columbus, Ohio, on April 21 and 22, 1916, under the presidency of Professor G. D. Hubbard of Oberlin College. Fifty-five members were in attendance.

GENERAL PROGRAM.

FRIDAY, APRIL 21.

- 8:00 A. M.—Meetings of Committees.
9:00 A. M.—Business Meeting.
10:00 A. M.—Reading of Papers in General Session.
11:45 A. M.—Address by Prof. George D. Hubbard, President of the Academy: "What Has the Future for Geologists?"
12:15 P. M.—Lunch, Ohio Union.
1:30 P. M.—Reading of Papers in General Session.
3:00 P. M.—Reading of Papers, in Sectional Meetings.
5:45 P. M.—Dinner, Ohio Union, together with Ohio College Association and Affiliated Societies.
7:30 P. M.—Joint Session with Ohio College Association and Affiliated Societies.
Chairman, President Miner Lee Bates, of the Ohio College Association, Hiram College.
Address of Welcome, President W. O. Thompson, Ohio State University.
Address, Professor Charles H. Judd, University of Chicago:
"The More Complete Articulation of Higher Institutions with the High Schools."
Informal Social Gathering of Members and Visitors.

SATURDAY, APRIL 22.

9:00 A. M.—Meeting of Ohio College Association—Symposium of Addresses by Representatives of Affiliated Societies.

“The Relation of the College to Research,” Professor Lewis G. Westgate, Ohio Wesleyan University, representing the Ohio Academy of Science.

“Academic Relationships in the Training of Teachers,” Dean H. C. Minnich, Miami University, representing the Ohio Society of College Teachers of Education.

“The Training of Science and Mathematics Teachers, Prospective and in Service,” Professor George R. Twiss, Ohio State University, representing the Association of Ohio Teachers of Mathematics and Science.

“Mathematics and the College Curriculum,” Professor A. D. Pitcher, Western Reserve University, representing the Ohio Section of the Mathematical Association of America.

10:45 A. M.—Reading of Papers in General Session.

11:45 A. M.—Adjourned Business Meeting.

MINUTES OF BUSINESS MEETINGS.

The first business session was called to order by President Hubbard at 9:00 A. M., on Friday, April 21. An adjourned session was held at 11:45 on the following morning.

The appointment of the following committees for the meeting was announced by the chair:

Committee on Membership—C. G. Shatzer, E. P. Durrant, Frank Carney.

Committee on Resolutions—L. B. Walton, Frank R. Elliott, A. B. Plowman.

Committee on Necrology—W. C. Mills, J. S. Hine, J. H. Schaffner.

The following Auditing Committee was elected by the Academy: C. G. Shatzer, W. R. Lazenby.

The following Nominating Committee was elected by the ballot of the Academy just before the close of the first business session: F. C. Blake, F. L. Landacre, Frank Carney.

Report of the Secretary.

The following report by the Secretary was received and ordered filed:

DELAWARE, OHIO, April 19, 1916.

The work of the Secretary since the last Annual Meeting has been largely routine.

A report of the Anniversary Meeting was printed in the OHIO JOURNAL OF SCIENCE and in SCIENCE; and notice of the present meeting

has been sent to the leading dailies in Columbus, Cincinnati, Cleveland and Toledo.

As directed by the Academy, letters containing the relevant portions of the report presented at the last meeting by the Committee on Resolutions were sent to the societies naming delegates to the Anniversary Meeting, to all delegates in attendance, and to other individuals and organizations mentioned in the resolutions.

The Secretary has also followed the instructions of the Academy in revising and reprinting the circular of information concerning the scope of the work of the Academy. The revised circular was mailed with the preliminary announcement of this meeting.

At the last meeting the Secretary reported correspondence with Dean Leutner, Secretary of the Ohio College Association, concerning the desirability of an active co-operation of the Academy with the College Association. The change in the date of the annual meeting of the Academy has made such co-operation possible and natural. Further correspondence and conferences with the members of the Program Committee and with Dean Leutner have resulted in the present arrangement of the program. It may be noted that a rather unusually small number of titles on the Academy program has facilitated this co-operation. A fuller program might well lead to complications. In view of this fact, it may be wise for the Academy to take action at this meeting, instructing next year's Secretary and Program Committee as to the desirability of continuing, extending, or restricting this affiliation with the Ohio College Association and other societies.

Respectfully submitted,

EDWARD L. RICE, *Secretary*.

Report of the Treasurer for the Year 1916.

The report of the Treasurer was received as follows, and referred to the Auditing Committee:

For the year since our last annual meeting, the receipts, including balance from last year, have amounted to \$547.70, and the expenditures to \$249.57, leaving a cash balance of \$298.13.

RECEIPTS.

Balance from last year.....	\$171.30
For sale of publications.....	98.40
Membership dues.....	278.00
Total.....	\$547.70

EXPENSES.

Miscellaneous expenses.....	\$ 64.57
185 subscriptions to THE OHIO JOURNAL OF SCIENCE.....	185.00
Balance April 21, 1916.....	298.13
Total.....	\$547.70

Respectfully submitted,

JAS. S. HINE, *Treasurer*.

Report of the Executive Committee.

The report of the Executive Committee was received as follows and ordered filed.

DELAWARE, OHIO, April 21, 1916.

Since the last Annual Meeting of the Academy two joint meetings of the Executive Committee and Publication Committee have been called—December 28, 1915, and April 21, 1916.

At the first meeting it was decided to hold the Annual Meeting of the Academy for 1916 in Columbus on April 21 and 22, in affiliation with the meeting of the Ohio College Association. The details of co-operation were left to the Program Committee for adjustment.

Owing to scanty attendance at this meeting, the consideration of the publication of the addresses presented at the Anniversary Meeting (referred by the Academy to the joint committees) was deferred. At the meeting of April 21 it was decided, after discussion, that the financial condition of the Academy will permit the publication of all the addresses in the Report of the Anniversary Meeting, and the Publication Committee was instructed to proceed with the publication.

Since the last Annual Meeting two applications for membership have been approved by the Executive Committee. These names will be presented to the Academy later for ratification.

Respectfully submitted,

EDWARD L. RICE, *Secretary.*

Report of the Emerson McMillin Research Fund.

The following report of the Trustees of the Research Fund was received and referred to the Auditing Committee.

For that part of the year 1915-16, dating from Nov. 25, 1915 to April 21, 1916.

RECEIPTS.

Unappropriated balance Nov. 25, 1915.....	\$264.91
Check from Emerson McMillin.....	250.00
	\$514.91

EXPENDITURES.

Dec. 4, 1915. L. B. Walton, for research.....	6.50
	\$508.41

ASSIGNMENTS FOR 1916-17.

S. R. Williams and W. H. Shideler.....	\$25.00
L. S. Hopkins.....	50.00
B. W. Wells.....	50.00
F. L. Landacre.....	75.00
	\$200.00

Leaving an unassigned balance in the Treasury, April 21, 1916..\$308.41

WILLIAM R. LAZENBY, *Chairman.*

Report of the Publication Committee.

The report of the Publication Committee was received as follows and ordered filed.

The committee has published no reports since the November meeting.

The committee recommends that after the publication of the reports of the 25th meeting, the Proceedings of the Academy be enlarged to the standard magazine size, 7 x 10 inches.

JOHN H. SCHAFFNER, *Chairman.*

Report of the Library Committee.

For the Library Committee, Professor Mills made an oral report, introducing Mr. Reeder, of the Ohio State University Library. The following report by Mr. Reeder was received and ordered filed.

To the Ohio Academy of Science:

The University Library begs to report that it has cared for all the accessions to the Library of the Academy which have been received since the November meeting, 1915. The deposit has been moved to Deck 5, in the book stack, on which floor is shelved the Library's file of reports and proceedings of scientific societies.

During the period covered by this report, publications of the Academy have been sold to the amount of \$22.00. This sum has been turned over to the Treasurer.

All correspondence, concerning the publications of the Academy and its exchanges, has been given prompt attention and is on file in the University Library.

Very respectfully,

C. W. REEDER.

April 21, 1916.

Report of the Committee on the Ohio Journal of Science.

The Committee on the Relation of the Academy to the Ohio Journal of Science presented a divided report. The majority favored the continuance of the present relation, modified somewhat in the direction of a closer affiliation; a minority recommended "that the present relationship of the Academy and the Ohio Journal of Science be terminated, and a committee be appointed to consider the question of some form of Academy publication, as ample and representative as our income will permit."

After extended discussion, the Academy took the following actions:

1. That the Committee on the Relation of the Academy to the Ohio Journal of Science be instructed to formulate more definitely the two plans, proposed respectively in the majority and minority reports, and to submit both to the membership of the Academy for an expression of opinion, this to be considered not as a formal ballot, but merely as a guide in the further consideration of the question by the next Annual Meeting.

2. That the Academy request the appointment upon the Editorial Board of the Journal of one representative from each organized section of the Academy. (Note—The Secretary has received notice of the cordial agreement of the management of the Journal to this request.)

3. That the detailed arrangements for the coming year be referred to the Executive Committee with power.

No formal report was presented by the Committee on Legislation. The Committee was continued.

Report of Committee on Catalog of Scientific Journals.

The following report was presented by Mr. Reeder, of the Ohio State University Library, for the Committee on Catalog of Scientific Journals. The report was received and ordered filed and the Committee continued to carry on the work.

April 21, 1916.

To the Ohio Academy of Science:

The Committee on the Union Catalog of Scientific Periodicals begs leave to submit the following report:

At a meeting held during the sessions of the American Association for the Advancement of Science, at the Ohio State University, December, 1915, it was decided to co-operate with the College Section of the Ohio Library Association in the preparation, not of a *purely scientific* catalog, but in a catalog of *all* periodical sets in Ohio Libraries. The College Section of the Library Association, at its annual meeting in October, 1915, appointed a committee consisting of Messrs. Miller (Ohio Wesleyan), Read (Cincinnati), and Reeder (Ohio State), to begin the preparation of a Union Catalog which would be of assistance to the Universities and Colleges in handling requests for the inter-library loan of books and volumes of sets. The Committee of the Academy felt that such a Union Catalog, if complete, would include the scientific and technical sets, and therefore duplicate the catalog planned by the Academy. It was decided that co-operation in this undertaking was

advisable. Mr. C. W. Reeder, representing both the Library Association and the Academy, was instructed to draw up a statement outlining in detail the plans of both organizations for the preparation of the joint union catalog. After considerable correspondence, the following statement, which was to be sent to libraries, was agreed upon:

UNION CATALOG OF PERIODICAL SETS IN OHIO LIBRARIES.

The Ohio Academy of Science and the College Section of the Ohio Library Association, jointly, propose to compile a Union Catalog of the periodical and scientific sets (except documents) in the libraries of the State. This catalog is to be made on cards, (Library Bureau No. 33030 or any 3 x 5 stock) and filed with the Ohio State University Library, the official depository of the Ohio Academy of Science. Ultimately the Academy hopes to print this union catalog for the benefit both of librarians and of scientists. However, until printed, it will be possible for any one to write directly to the Ohio State University Library and secure information concerning the location of any scientific set in the State.

The Library of Congress rules will be followed in main entry. If a series has ceased publication, or has not been continued, the closed entry will be used as v. 1-10, 1865-1874. If the series is being continued, the open entry will be used, as v. 1, 1900-.

When the cards are received at the University Library, they will be stamped with the name of the sending library, and filed in the Union Catalog. If desired, any library may add its classification marks to the catalog cards.

It is recommended that the deposit include all the periodical sets (except documents) in the possession of the co-operating libraries.

The Ohio Academy of Science has been working on such a proposition for several years, and much of preliminary data has been received. At the October, 1915, meeting of the Ohio Library Association, a committee was named to compile a Union Catalog of periodical sets, so that librarians might know where sets are when needed by them in the various universities and colleges.

Therefore this joint effort of the two associations as outlined above, will bring into existence a bibliographical tool, the value of which will be indispensable to the college librarians and to the scientists of the Ohio Academy.

You are urged to co-operate in this undertaking by sending to the Ohio State University Library, the card record of your periodical sets, excluding documents.

The next step consisted in the preparation of a list of the libraries which would be invited to submit the record of their periodical sets. After correspondence, the following thirty-nine institutional libraries were selected:

Adelbert College Library.
Akron Municipal University Library.
Antioch College Library.
Baldwin-Wallace College Library.
Case Library (Cleveland).
Case School of Applied Science Library.
Cincinnati Public Library.
Cincinnati University Library.
Cleveland Public Library.
Columbus Public Library.
Dayton Public Library.
Denison University Library.
Hebrew Union Theological Seminary Library.
Heidelberg University Library.
Hiram College Library.

Kenyon College Library.
Lake Erie College Library.
Lloyd Library (Cincinnati).
Marietta College Library.
Mechanics Library, Cincinnati.
Miami University Library.
Oberlin College Library.
Ohio State Library.
Ohio State University Library.
Ohio University Library.
Ohio Wesleyan University Library.
Ohio Archaeological & Historical Society Library.
Otterbein College Library.
St. Ignatius College Library.
St. John's University Library.
St. Mary's College Library.
St. Xavier's College Library.
Toledo University College Library.
Toledo Public Library.
Western College for Women Library.
Western Reserve University College for Women Library.
Wilberforce University Library.
Wittenberg College Library.
Wooster College Library.

Letters with enclosure of the statement of plans were sent out to these libraries on March 24 and 25, 1916. To date, favorable replies have been received from eighteen (18) as follows:

Adelbert College Library.
Akron Municipal University Library.
Antioch College Library.
Case School of Applied Science Library.
Cincinnati Public Library.
Cleveland Public Library.
Hiram College Library.
Lloyd Library (Cincinnati).
Mechanics Library (Cincinnati).
Miami University Library.
Oberlin College Library.
Ohio State Library.
Ohio State University Library.
Ohio University Library.
Ohio Archaeological and Historical Society Library.
Ohio Wesleyan University Library.
Toledo Public Library.
Wittenberg College Library.

In two cases, the contributions have been sent in for the Union Catalog. Case School of Applied Science has printed a pamphlet giving the titles of sets and their completeness. Lloyd Library has issued as

Bibliographical Contribution, V. II, No. 1, "Catalogue of the Periodical Literature in the Lloyd Library," 104 pp. Two copies of these printed records have been secured, the entries have been clipped and pasted on cards, ready for filing.

It is not necessary to go into the detailed questions which are arising in connection with the preparation of these records in the various libraries. The points are numerous, but each is being given consideration so that this Union Catalog may approach, as far as possible, the acme of perfection.

Some letters reveal conditions which must be very disheartening to both the librarians and to the users, many of whom are members of the Academy.

"We do not have at present any separate list or catalogue of our periodical sets."

"A certain proportion of our periodical sets, just how large I cannot at present say, have never been classified or catalogued."

"Our periodicals have never been catalogued and we have only memorandum records at present."

The Committee recognizes that the request made upon the various libraries entails some work and perhaps some readjustment. If, however, this request will cause some libraries to straighten out the conditions surrounding the periodical sets, to make catalogs, to classify, to purchase or fill in missing volumes, and in general to improve the records, then at least one tangible result, with some attendant good, has been accomplished, not only beneficial to the libraries, but also to the members of the Academy and other users.

The Committee suggests that the members of the Academy, who come from institutions which have not yet signified their intention of joining this co-operative undertaking, should use their influence with the library authorities to prepare the data desired for the Union Catalog.

Very truly yours,

C. W. REEDER,

For the Committee.

Election of Officers.

From the double slate of nominations prepared by the Nominating Committee, the following officers for 1916-17 were elected by the ballot of the Academy:

President—Professor F. O. GROVER, Oberlin College, Oberlin.

Vice-President for Zoology—Professor STEPHEN R. WILLIAMS, Miami University, Oxford.

Vice-President for Botany—Professor E. L. FULLMER, Baldwin-Wallace College, Berea.

Vice-President for Geology—Professor AUGUST FOHRSTE, Steele High School, Dayton.

Vice-President for Physics—Professor M. E. GRABER, Heidelberg University, Tiffin.

Secretary—Professor E. L. RICE, Ohio Wesleyan University, Delaware.

Treasurer—Professor J. S. HINE, Ohio State University, Columbus.

Elective Members of Executive Committee—Professor BRUCE FINK, Miami University, Oxford; Professor L. B. WALTON, Kenyon College, Gambier.

Member of Publication Committee—Professor J. A. CULLER, Miami University, Oxford.

Trustee of Research Fund—Professor M. M. METCALF, Oberlin College, Oberlin.

Member of Library Committee—Mr. C. W. REEDER, Ohio State University, Columbus.

Election of Members.

The Membership Committee reported fifteen names for election to membership, marked with * in the following list; two additional names already approved by the Executive Committee were also presented for ratification. The entire list was elected as follows:

* Baker, Rollo C., Anatomy, O. S. U., Columbus.

* Cole, Archie E., Zoology, Plymouth.

* Cole, Margaret, Biology, Plymouth.

* Forman, Johnathan, Pathology, Medical College, N. Park St., Columbus.

Harmount, Geo. P., Geology, Archeology, 2290 Indianola Ave., Columbus.

* Knouff, Ralph A., Anatomy, O. S. U., Columbus.

* McCloy, James H., Physics, Westerville.

* McPeck, Clayton, Physiology, 110 W. First Ave., Columbus.

* Martin, Benj., Entomology, Zoology, Berea.

* Okey, Catharine W., Anatomy, Zoology, O. S. U., Columbus.

* Reed, Carlos I., Physiology, 97 Price St., Columbus.

* Reeder, C. W., Library, O. S. U., Columbus.

* Scott, Ernest, Pathology, Medical College, N. Park St., Columbus.

* Stehle, Mabel E., Zoology, Entomology, 100 Mithoff St., Columbus.

Stout, Harry O., Botany, Geology, Agriculture, Zoology, 1031 Alger St., Fremont.

* Warren, James H., Anatomy, Medical College, N. Park St., Columbus.

* Weston, William H., Jr., Botany, Zoology, Biological Laboratory, Adelbert College, Cleveland.

In view of the work of Mr. Reeder in connection with the library of the Academy, it was voted that his membership dues be remitted, as was formerly provided by the Constitution in case of the Librarian.

Report of the Committee on Resolutions.

The following report was presented by the Committee on Resolutions, and adopted by the Academy.

Resolved, That the Academy heartily thank the authorities of the State University and the members of the Local Committee for their efforts in making the 26th Annual Meeting one successful in every way.

Resolved, That the members of the Academy formally thank Mr. Emerson McMillin for his continued support of research work in Ohio.

Resolved, That the Academy express its appreciation of the work done by Mr. Reeder of the University Library for his efforts in connection with cataloging the scientific literature of Ohio.

(Signed),

L. B. WALTON,
FRANK R. ELLIOTT,
A. B. PLOWMAN.

The Report of the Committee on Necrology.

The following report was presented by the Committee on Necrology:

It becomes our painful duty, as Committee on Necrology, to report the death of two members of the Ohio Academy of Science. Professor F. M. Webster, of Washington, D. C., and Prof. John Royer, of Bradford, Ohio.

Prof. Webster's death came very unexpectedly. He came to Columbus during the holiday recess to attend the meeting of the American Association for the Advancement of Science. He arrived in the city on Monday and the Chairman of your Committee had the pleasure of meeting him at that time, and had quite a talk with him concerning old associations of the Academy. He expressed to me at that time, his regret that he was unable to attend the Quarter Centennial of the Academy but was glad to be back in Columbus and see the old places he knew in early days.

Prof. Webster was connected with the Bureau of Entomology, Washington, D. C. He died at Grant Hospital, Monday morning, January 3, 1916. He was taken ill on Wednesday evening preceding his death. After being stricken with his final illness, he felt sure of a speedy recovery, but as the days went by, he became worse and was taken to the hospital, where he passed away in a short time.

Prof. Webster was one of the most prominent of American entomologists and his death will be mourned by scientists in all parts of the world. His home was in Kensington, Md., and his office was at the Department of Agriculture in Washington.

Professor Webster was born at Lebanon, N. H., August 8, 1849. He received his degree of M. S. from the Ohio University in 1893.

From 1882 to 1884 he was State Entomologist for Illinois. Following the termination of his position, he was connected with the Government Agricultural Station until 1904, when he was placed in charge of cereal and forage-crop insect investigation for the U. S. Department of Agriculture. Professor Webster was one of the most prominent scientists in the Government service. He was sent to Melbourne, Australia, as special representative to the International Exposition held in that city in 1888-1891. He also was sent to Tasmania and New Zealand to study agricultural methods in these countries.

At the time of his death he was President of the Biological Society of Washington. Professor Webster was very active in the affairs of the

Academy in its early years and was elected as third President of the Academy in 1894; during all of the time of his connection with the Experiment Station at Wooster he was very active in Academy work, presenting many papers and taking an active interest in discussions.

He was ex-President of the Association of Economic Entomology, ex-President of the Society of Entomology at Washington, D. C., ex-President of the National Geographical Society, ex-President of the American Association of Naturalists, and an honorary member of many other scientific associations and societies of the country. His contributions to scientific publications, have been of special interest to scientists from all parts of the world; and in this way he made himself one of the most important men in the service of the government.

Professor John Royer died at Bradford, Ohio, October 13, 1915. He was born January 31, 1845.

Professor Royer was one of the early educators in Ohio, having spent more than forty years of his life as a teacher. He taught in the schools of Ansonia, Gettysburg, Versailles and Pleasant Hill, and was the first man to receive a certificate as a teacher in Darke County.

Professor Royer was the publisher of many books. Royer's Mental Arithmetic had a wide circulation, more than 120,000 of these books having been sold.

He also published Royer's Geography, which had quite a sale, as well as Royer's Course in English.

At one time Prof. Royer was editor of *The School Visitor*, which was published at Columbus and at Versailles, Ohio. He afterwards sold his interest in this publication to *The Ohio Teachers Magazine*, with which it was merged.

Professor Royer spent the last ten years of his life in retirement.

WM. C. MILLS,
JOHN H. SCHAFFNER,
J. S. HINE.

Report of the Auditing Committee.

The Auditing Committee presented the following report, which was accepted and ordered filed.

April 21, 1916.

The committee appointed by the Ohio Academy of Science to audit the books of the Treasurer, has examined the accounts and finds them as reported.

The committee appointed by the Ohio Academy of Science to audit the books of the Treasurer of the Emerson McMillin Research Fund, has examined the accounts and finds them as reported.

Respectfully,

C. G. SHATZER,
WILLIAM R. LAZENBY.

The meeting adjourned without determining the place of the next meeting.

SCIENTIFIC SESSIONS.

The complete scientific program of the meeting follows:

Presidential Address.

What Has the Future for Geologists? G. D. HUBBARD

Addresses in Joint Session with Ohio College Association and Affiliated Societies.

(See Page 13).

Papers.

1. Parthenogenesis in the Dandelion. 20 min. (Lantern). PAUL B. SEARS
2. Exploration of Tremper Mound. 30 min. (Lantern). W. C. MILLS
3. The Educational Value of Wood Study. 10 min. (Lantern). A. B. PLOWMAN
4. Botanizing in Porto Rico. 30 min. (Lantern). BRUCE FINK
5. Parallelism between the Cystid Agelacrinites (fossil) and the Holothurian
Psolus (recent), with Demonstrations. 15 min. STEPHEN R. WILLIAMS
6. The Axial Rotation of Microorganisms and its Evolutionary Significance.
10 min. L. B. WALTON
7. A New Method for Marking Slides. 3 min. PAUL B. SEARS
8. Notes on Ohio Tingitidae. 6 min. CARL J. DRAKE
9. Insect Population of Grasslands. 12 min. (Lantern). HERBERT OSBORN
10. Genitalia of the Bedbug, with special reference to a Unique Method of
Copulation. 7 min. (Lantern). P. B. WILTBERGER
11. The Origin of the Gasserian and Profundus Ganglia in Rana. 5 min.
RALPH A. KNOUFF, introduced by F. L. LANDACRE
12. The Fusion of the Gasserian and Profundus Ganglia in Plethodon. 5 min.
KATHERINE OKEY, introduced by F. L. LANDACRE
13. The Origin of the Placodal Ganglia in Squalus. 7 min.
C. I. REED, introduced by F. L. LANDACRE
14. Concerning Thyroid Glands in Amphibia. 10 min. (Lantern).
R. A. BUDINGTON
15. Feeding Thymus and Thyroid Extracts. 5 min. E. P. DURRANT
16. Notes on Protozoa. (a) A Review of the Arcellidae. (b) Supplement
to the Euglenoidina. 6 min. L. B. WALTON
17. Notes on Birds. 10 min. H. A. ALBYN
18. A New Three-Salt Nutrient Solution for Sand and Water Cultures.
10 min. A. G. MCCALL
19. An Adjustment of the Sliding Microtome for Cutting Lignified Tissue.
2 min. FOREST B. H. BROWN
20. Notes on the Structure and Function of the Green Layer of the Bark of
Woody Plants. 8 min. (Lantern). FOREST B. H. BROWN
21. The Distribution of Fungi in Porto Rico. 10 min. BRUCE FINK
22. The Genus Physcia in Ohio. 10 min.
MARTHA MCGINNISS, introduced by BRUCE FINK
23. Decrease of Permeability with Age (Preliminary Note). 5 min.
H. M. BENEDICT
24. Methods of Spore Formation in the Zygnematales. 10 min. E. N. TRANSEAU

25. Notes on the Germination of Tree Seeds. 10 min. WILLIAM R. LAZENBY
26. The Quince Leaf-Spot. 10 min. W. G. STOVER
27. A Blade Blight of Corn. 10 min. W. G. STOVER and W. N. ANKENY
28. The Occurrence of the Volutella Rot in Ohio. 5 min. . . GUSTAV A. MECKSTROTH
29. Observations on the Ontogeny of the Gall of *Pachypsylla mama* Riley.
30 min. (Lantern) B. W. WELLS
30. On Wavemarks. 10 min. (Lantern) WALTER H. BUCHER
31. The Northward Extension of the Physiographic Provinces of the United
States. 20 min. W. N. THAYER
32. Additions to the Anatomy of *Lepadocystis moorei*. 5 min. . . W. H. SHIDELER
33. Resistance of Electrolytes by a modification of Kohlrausch's Method.
12 min. M. E. GRABER
34. Demonstration of Apparatus showing Analogy between Reactance
Phenomena in Alternating Current Circuits and in Fluids. 15 min.
F. C. CALDWELL
35. Absorption of High Frequency X-rays. 15 min. S. J. M. ALLEN
36. A Relative Score Method for Unmeasured Characters. 10 min. . A. G. MCCALL
37. The Revegetation of the Katmai District of Alaska. 35 min. (Lantern),
ROBERT F. GRIGGS
38. The Symbols used in Geometry. JOHN H. WILLIAMS
39. Crystals. W. N. SPECKMAN

Demonstrations.

1. Certain Points in the Celloidin Method. A. B. PLOWMAN
2. A Recent Ohio Specimen of Henslow's Sparrow. EDWARD L. RICE

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PROCEEDINGS
OF THE
OHIO
ACADEMY OF SCIENCE

VOLUME VII, PART TWO

Annual Report
Twenty-seventh Meeting

ANNUAL REPORT

OF THE

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Twenty-seventh Meeting

1917

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- '17. ORCUTT, RUTH, *Botany, Zoology*.....Granville
- '98. OSBORN, HERBERT, *Entomology, Zoology*.....O. S. U., Columbus
- '96. OSBURN, RAYMOND C., *Zoology, Ichthyology*,
Botany and Zoology Bldg., O. S. U., Columbus
- '08. PARKHURST, C. P., *Science*.....9 West Long St., Columbus
- '14. PERRY, FRED, *Botany*.....R. F. D., Leipsic
- '11. PHILLIPS, RUTH L., *Biology and Allied Sciences*.....Western College, Oxford
- '93. PIWONKA, THOMAS.....226 Superior Ave., N. W., Cleveland
- '15. PLOWMAN, AMON B., *Botany, Physiology, Zoology*, 126 S. Maple St., Akron
- '15. PRATT, DELBERT R., *Botany, Zoology, Bacteriology*, 560 Cherry St., Marion
- '12. PROSE, CHAS. T., *Physics*.....1333 Maple Ave., Zanesville
- '12. RANKIN, JOHN P., *Biology, Medicine*.....415 Earl Court, Elyria
- '13. RECKER, PAUL C., *Biology, Physics, Chemistry*,
341 Chittenden Ave., Columbus
- '16. REED, CARLOS I., *Physiology*.....710 N. Park St., Columbus
- '16. REEDER, C. W.....Library, O. S. U., Columbus
- '11. REESE, CHAS. A., *Zoology, Entomology*.....Morgantown, W. Va.
- '01. RICE, EDWARD L., *Zoology*.....Delaware
- '12. RICHARDS, CLARISSA A., *Botany, Zoology*.....Oxford
- '11. ROBINSON, J. M., *Entomology*.....Dept. Entomology, Raleigh, N. C.
- '13. ROBINSON, RAY R., *Geology, Biology*.....Newcastle
- '13. ROGERS, CHARLES G., *Physiology*.....Oberlin College, Oberlin
- '14. ROOD, ALMON N., *Botany*.....R. F. D. No. 2, Phalanx Station
- '00. ROUDEBUSH, LOWELL.....R. F. D. No. 3, New Richmond
- '10. RUSH, R. C., *Conchology*.....Hudson
- '02. SANDERS, J. G., *Entomology, Botany*, Dept. of Agriculture, Harrisburg, Pa.
- '97. SCHAFFNER, J. H., *Botany*.....O. S. U., Columbus
- '13. SCHEAR, E. W. E., *Biology*.....107 W. Park, Westerville
- '07. SCHEFFEL, EARL R., *Geology*.....341 River St., Dayton
- '12. SCHROYER, CHARLES R., *Geology*.....5725 Drexel Ave., Chicago, Ill.
- '15. SCOTT, EDWARD B., *Meteorology, Botany*.....1894 Summit St., Columbus
- '16. SCOTT, ERNEST, *Pathology*.....Medical College, N. Park St., Columbus
- '15. SEARS, PAUL B., *Botany, Entomology*.....O. S. U., Columbus
- '91. SELBY, A. D., *Botany*.....Experiment Station, Wooster
- '14. SEYMOUR, RAYMOND, JESSE, *Physiology, Zoology, Botany*,
Dept. Physiology, O. S. U., Columbus

- '12. SHADLE, ALBERT, *Zoology*....Zool. Laboratory, Cornell Univ., Ithaca, N. Y.
- '11. SHARP, MRS. KATHARINE DOORIS, *Botany, Geology*....60 N. Main St., London
- '08. SHATZER, C. G.....25 E. Cecil St., Springfield
- '08. SHAW, N. E., *Entomology*.....State House, Columbus
- '15. SHETRONE, H. C., *Archeology*....Museum and Library Building, Columbus
- '13. SHIDELER, W. H., *Geology*.....Oxford
- '10. SHILLIDAY, C. L., *Zoology*.....University of Buffalo, Buffalo, N. Y.
- '15. SHUMAN, S. C., *Botany*.....Fitchville
- '13. SHUMAN, W. L., *Botany*.....Chicago Junction
- '09. SIM, ROBERT J., *Ornithology, Zoology*.....Jefferson
- '08. SMITH, ARTHUR L., *Geology*.....Valley Crossing
- '05. SMITH, G. D., *Botany, Zoology*.....Richmond, Ky.
- '02. SNYDER, F. D., *Zoology, Ethnology*.....Ashtabula
- '17. SPEAKS, JOHN C., *Ichthyology, Ornithology*.....Columbus
- '12. SPECKMAN, W. N., *Geology*.....New Lyme
- '12. STANLEY, CLYDE M., *Zoology*.....High School, Alliance
- '05. STAUFFER, CLINTON R., *Geology*....Univ. of Minnesota, Minneapolis, Minn.
- '16. STEHLE, MABEL E., *Zoology, Entomology*.....100 Mithoff St., Columbus
- '94. STERKI, VICTOR, *Conchology, Botany*.....New Philadelphia
- '03. STICKNEY, M. E., *Botany*.....Granville
- '15. STOUT, HARRY O., *Botany, Geology, Agriculture, Zoology*,
606 E. State St., Fremont
- '08. STOUT, W. E., *Chemistry, Ceramics, Geology*....40 E. Lane Ave., Columbus
- '09. STOVER, W. GARFIELD, *Botany*.....O. S. U., Columbus
- '03. SWEEZEY, OTTO H.....Twelfth Ave., Honolulu, Hawaii
- '11. THAYER, WARREN N., *Geology*.....Ohio Mechanics Institute, Cincinnati
- '15. THOMAS, ROY C., *Botany, Zoology, Geology*.....R. F. D. 5, Mt. Gilead
- '13. THOMPSON, LAWRENCE J., *Biology, Chemistry*..21 University Ave., Delaware
- '94. TODD, JOSEPH H., *Geology, Archeology*.....Christmas Knoll, Wooster
- '15. TRANSEAU, EDGAR N., *Botany*.....O. S. U., Columbus
- '15. TROTT, T. ELMER, *Mathematics, Astronomy*..2221 Ridgewood Ave., Alliance
- '12. TURNER, CLARENCE L., *Zoology*.....105 Campbell St., Delaware
- '12. UNNEWEHR, EMORY C., *Physics*.....Baldwin-Wallace College, Berea
- '15. VAN CLEVE, M. R., *Physical Geography, Botany*....542 Ardin Place, Toledo
- '11. VERWIEBE, WALTER A., *Geology*.....Orton Hall, O. S. U., Columbus
- '15. VIVIAN, ALFRED, *Agriculture, Chemistry*.....O. S. U., Columbus
- '04. WAITE, F. C., *Anatomy, Zoology*.....1353 E. Ninth St., Cleveland
- '02. WALTON, L. B., *Biology*.....Gambier
- '16. WARREN, JAMES H., *Anatomy*..Medical College, 710 N. Park St., Columbus
- '98. WEBB, R. J., *Botany*.....Garrettsville
- '12. WEINLAND, CLARENCE R., *Physics*.....North High School, Columbus
- '11. WELLS, B. W., *Botany*.....Grubbs Vocational College, Arlington, Tex.
- '96. WERTHNER, WILLIAM B., *Botany*.....Steele High School, Dayton
- '01. WESTGATE, LEWIS G., *Geology*.....Delaware
- '16. WESTON, WILLIAM H., JR., *Botany, Zoology*,
Federal Horticulture Board, Washington, D. C.

- '15. WILLIAMS, JOHN N., *Mathematics, Physics, Chemistry*,
227 W. Reynolds St., Urbana
- '13. WILLIAMS, SAMUEL R., *Physics*.....Oberlin College, Oberlin
- '03. WILLIAMS, STEPHEN R., *Biology*.....Miami University, Oxford
- '97. WILLIAMSON, E. B., *Entomology*.....Bluffton, Ind.
- '08. WILSON, STELLA S., *Geography, Geology*.....Station B, Route 7, Columbus
- '14. WILTBERGER, P. B., *Entomology, Zoology*,
Michigan Agricultural College, E. Lansing, Mich.
- '15. WITHROW, JAMES R., *Chemistry, Mineralogy*.....O. S. U., Columbus
- '92. WRIGHT, G. FREDERICK, *Geology*.....Oberlin
- '15. WYKOFF, HARRY S., *Biology, Botany*.....Station A, No. 4, Alliance
- '17. YAMPOLSKY, CECIL, *Botany, Zoology, Genetics*.....Toledo Univ., Toledo
- '03. YORK, HARLAN H., *Botany*.....Brown Univ., Providence, R. I.
- '15. YOST, RALPH, *Genetics, Botany, Bacteriology*.....Box 81, Thornville
- '06. YOUNG, R. A., *Botany*.....120 Chestnut Ave., Takoma Park, D. C.

Total Membership—258.

REPORT

OF THE

TWENTY-SEVENTH ANNUAL MEETING

OF

THE OHIO ACADEMY OF SCIENCE

The Twenty-seventh Annual Meeting of the Ohio Academy of Science was held at Ohio State University, Columbus, Ohio, April 6 and 7, 1917. In the absence of the president, Professor F. O. Grover, of Oberlin College, Professor Stephen R. Williams, of Miami University, vice-president for Zoology, presided over the meeting. Fifty-one members registered in attendance.

GENERAL PROGRAM

FRIDAY, APRIL 6

- 9:00 A. M.—Business Meeting.
- 10:00 A. M.—Reading of Papers in General Session.
- 11:45 A. M.—Illustrated Lecture by Professor Robert F. Griggs, of Ohio State University: "Recent Explorations of Mt. Katmai, Alaska." In Place of Presidential Address on "Some Phases of Present Day Biological Unrest," by Professor F. O. Grover, of Oberlin College, whose attendance was prevented by illness.
- 12:15 P. M.—Lunch, Ohio Union.
- 1:30 P. M.—Reading of Papers in General Session.
- 3:00 P. M.—Reading of Papers, in Sectional Meetings.
- 5:45 P. M.—Dinner, Ohio Union.
- 7:30 P. M.—Public Lecture by Professor James R. Withrow, of Ohio State University: "The Relation of War to Chemistry in America."

SATURDAY, APRIL 7

- 9:00 A. M.—Adjourned Business Meeting.
- 10:00 A. M.—Reading of Papers in Sectional Meetings.

MINUTES OF BUSINESS MEETINGS

The first business session was called to order by Vice-President Williams at 9:00 A. M., on Friday, April 6. An adjourned session was held at 9:00 on the following morning.

The appointment of the following committees for the meeting was announced by the chair:

Committee on Membership—M. E. Stickney, A. W. Smith, F. L. Landacre.

Committee on Resolutions—E. L. Moseley, L. B. Walton, C. G. Shatzer.

Committee on Necrology—G. D. Hubbard, Herbert Osborn, A. D. Cole.

The following Auditing Committee was elected by the Academy: L. B. Walton, C. G. Shatzer.

The following Nominating Committee was elected by the ballot of the Academy just before the close of the first business session: L. B. Walton, G. D. Hubbard, A. D. Cole.

Report of the Secretary

The following report by the Secretary, read by the Acting Secretary, was received and ordered filed:

CAMBRIDGE, MASS., March 31, 1917.

To the Ohio Academy of Science:

The work of the Secretary for the past year has consisted mainly of routine work, largely in co-operation with the Executive and Program Committees.

A brief report of the Twenty-sixth Annual Meeting, 1916, was published in *SCIENCE*, July 28; the full report appeared in the *OHIO JOURNAL OF SCIENCE* for January. Notices of the present meeting have been sent to the leading dailies in Columbus, Cleveland, Cincinnati, and Toledo.

The officers of the Academy were notified of their election; and the relevant portions of the report of the Committee on Resolutions were transmitted to all persons and organizations receiving recognition in that report.

The Program Committee is to be congratulated on securing the services of Prof. Withrow for the Friday evening address. Prof. Withrow is giving this very timely address at serious personal inconvenience. His loyalty to the Academy and the spirit of national patriotism by which he is actuated should receive the fullest recognition of the Academy.

The gratitude of the Academy is also due to Prof. Griggs for his kindness and telegraphic promptness in filling in the gap in the program caused by the illness and absence of the President.

Two minor matters concerning the make-up of the program may well be mentioned here. Some members may be disappointed to find their papers scheduled for sectional meetings rather than general sessions; this has been necessitated by the presentation of an unusual number of titles of a general character. There have been presented, also, an unusually large number of titles unaccompanied by specifications as to time needed. This causes no inconsiderable complication in the arrangement of the program. A uniform allowance of ten minutes has been made in such cases; for the future the secretary would recommend the reduction of this allowance to five minutes.

During the past year the Secretary has prepared a card catalog of the membership of the Academy, past and present, with record of dates of admission and withdrawal. Some inaccuracies (due largely to variation in spelling and to change of name on the part of the ladies) are still to be corrected; but the following summary is approximately correct, and may be of interest to the members:

Ex-Members	455
Present Members	265
Total	720

The preparation of this catalog has made possible the record in the published membership list of the dates of admission to the Academy. The Secretary will be grateful for the correction of any errors which may have slipped into this record.

Preliminary steps have been taken this year looking toward the establishment of sections for Psychology and Chemistry; and it is hoped that another year may see these sections organized. The secretary has also very recently received the suggestion of the desirability of a section for the medical (or near-medical) sciences—Anatomy, Physiology, and Pathology. The program of this meeting shows the justification for this suggestion.

Some complications have arisen because of the Secretary's temporary absence from the state, but it is confidently expected that the very efficient work of Prof. Kreeker as chairman of the Local Committee and of Prof. Westgate as Acting Secretary for the meeting will prevent any loss to the Academy.

Respectfully submitted,

EDWARD L. RICE, *Secretary*.

Report of the Treasurer for the Year 1916-17

The report of the Treasurer was received as follows, and referred to the Auditing Committee, whose report is appended.

For the year since our last annual meeting, the receipts, including balance from last year, have amounted to \$599.73, and the expenditures to \$451.63, leaving a cash balance of \$139.10.

RECEIPTS

Balance from last year.....	\$298.13
For sale of publications.....	22.60
Membership dues.....	270.00

 \$590.73

EXPENSES

Miscellaneous expenses.....	\$ 48.88
180 subscriptions to the Ohio Journal of Science.....	180.00
Publishing Annual Report of the 25th meeting.....	222.75
Balance, April 6, 1917.....	139.10

 \$590.73

Respectfully submitted,

JAS. S. HINE, *Treasurer.*

 April 7, 1917.

The Auditing Committee has verified the receipts and expenditures of the Treasurer of the Academy, Professor J. S. Hine, and finds that they are correct.

L. B. WALTON
C. G. SHATZER.

 FINANCIAL
Report of the Executive Committee

The report of the Executive Committee was received as follows and ordered filed.

CAMBRIDGE, MASS., April 2, 1917.

To the Ohio Academy of Science:

The Executive Committee has held but one meeting during the year, on January 27. The officers of the Academy were invited to meet with the Committee. Profs. Hine, Walton and Rice, of the Committee were present, together with Profs. Foerste, Osborn, Schaffner and Westgate by invitation.

It was decided to hold the annual meeting on April 6 and 7, in Columbus.

The Program Committee was instructed to arrange an independent session of the Academy for Saturday morning, and to arrange for a joint meeting with the Ohio College Association for Friday evening *only* in case of agreement upon a distinctively scientific address. (When Prof. Withrow accepted the invitation to speak at the Friday evening meeting, an invitation was extended to the Ohio College Association to join with the Academy; but other arrangements had already been made.)

Dr. Mendenhall was appointed to fill the vacancy in the Board of Trustees of the Research Fund caused by the death of Prof. Lazenby; and Prof. Fenneman was requested to serve as chairman of the Board.

Prof. Westgate was appointed as Acting Secretary to serve during the absence of the Secretary.

The following communication from the Ohio State University Scientific Society was presented by the Secretary:

Columbus, May 29, 1916.

*Professor E. L. Rice, Secretary Ohio Academy of Science,
Ohio Wesleyan University, Delaware, Ohio:*

DEAR PROFESSOR RICE:—At the last meeting of the Ohio State University Scientific Society it was unanimously voted that the Ohio Academy of Science be requested to name "a representative of each section of science represented in the Academy (Zoology, Botany, Geology, Physics, to serve on the Editorial Board of the Ohio Journal of Science," such representatives ~~there in all~~ ^{there in all} ^{to be} members of the Ohio State University Scientific Society.

Will you be so kind as to notify such officers of the Academy as should receive this announcement.

Sincerely yours,

R. J. SEYMOUR, *Secretary.*

Owing to the near approach of the annual meeting, no formal action was taken by the Committee, but the appointment of representatives was left to the Academy as a whole.

In November, 1916, the Executive Committee decided by correspondence to join with other organizations in extending an invitation to the Central Association of Science and Mathematics Teachers to meet in Columbus next Thanksgiving. The following letter from the President of that Association should be presented to the Academy:

COLUMBUS, Ma

E. L. Rice, Secretary, The Ohio Academy of Science, Delaware, Ohio:

MY DEAR MR. RICE:—You will recall that your organization joined with a number of other organizations of the state in extending to the Central Association of Science and Mathematics Teachers an invitation to hold the next meeting in Columbus. The Central Association will meet in Columbus, November 30 and December 1, 1917. I take this means of suggesting to you that the Association will deeply appreciate any co-operation you may find it possible to give.

There will be a general meeting on Friday morning to which all are invited and at which a Science address will be made in addition to a general educational address. On Friday afternoon the sectional meetings will be held. On Friday evening there will be a banquet followed by detailed reports of plans for science and mathematics work in "The High School of To-morrow." On Saturday morning the general business meeting is held, followed by excursions to various places of interest in or near Columbus.

The Association invites you to be present and to take part in any and all of these meetings. The inspiration of this large body of teachers should be of great benefit to every similar organization in the state. Let us make this the biggest Science and Mathematics meeting ever held in Ohio.

Plan now to be present at the November meeting.

Yours very truly,

MARIE GUGLE, *President.*

This invitation has been acknowledged by the Secretary.

A single application for membership has been approved by the Executive Committee, and will be presented later for the ratification of the Academy.

Respectfully submitted,

EDWARD L. RICE,

Sec'y for Committee.

Report of the Publication Committee

The report of the Publication Committee was received as follows and ordered filed.

The committee has published the Report of the Twenty-fifth Annual Meeting, consisting of 202 pages and also the Report of the Twenty-sixth Annual Meeting, consisting of 26 pages. The first report was published at a cost of \$222.75, and the twenty-sixth, which was a partial reprint from the Ohio Journal of Science, at a cost of \$42.00.

The method of publication of the Proceedings of the Annual Meetings was not fully determined at the last meeting. The Executive Committee having been given power to act on its own initiative. After correspondence with members of the Executive Committee it was thought best to publish the Annual Report as heretofore, the first twelve pages consisting of list of officers and members, being set up separately, and the Secretary's Report reprinted from the Journal of Science. It was not thought necessary to reprint the President's address, since this will now be published regularly in the Ohio Journal of Science.

The committee recommends that the Proceedings of the Academy be handled in the regular way as heretofore, and that the Annual Report mainly a reprint from the Ohio Journal of Science, consisting of lists of officers and members, and the Secretary's Report be continued. The committee strongly urges that the publication of special papers be continued also and that if possible at least one be published each year.

Respectfully submitted,

JOHN H. SCHAFFNER, *Chairman*,
L. B. WALTON.

Report of the Emerson McMillin Research Fund

The following report of the Trustees of the Research Fund was received and referred to the Auditing Committee, whose report is appended.

April 5, 1917.

RECEIPTS

Balance April 21, 1916.....	\$308.41
Check from Emerson McMillin.....	250.00
	\$558.41

EXPENDITURES

Forest B. N. Brown.....	\$ 46.25
B. H. Wells.....	40.00
W. L. Du Bois.....	21.50
Stephen R. Williams.....	41.69
Wm. M. Barrows.....	19.60
Balance in Bank.....	389.37
	\$558.41

N. M. FENNEMAN.

April 7, 1917.

No report on the McMillin fund by the Auditing Committee is possible, inasmuch as vouchers, paid checks, and bank book are not submitted.

L. B. WALTON,
C. G. SHATZER.

Report of the Library Committee

For the Library Committee, Mr. Reeder, of the Ohio State University Library, presented the following report, which was received and ordered filed.

To the Ohio Academy of Science:

The Ohio State University Library begs to report that it has cared for all the accessions to the Library of the Academy, which have been received during the year 1916-17. The number of publications is not large, aggregating about one hundred (100) items.

During the year the annual reports of the twenty-fifth and twenty-sixth meetings of the Academy, for 1915 and 1916, were published. Copies were mailed to all members whose names appeared in each report and to all exchanges.

The sale of publications for the year has amounted to \$22.60. This sum has been turned over to the Treasurer.

The librarian desires to raise three questions on which he would like a vote of the Academy:

1. Is there any policy regarding the number of copies of a Special Paper which may be presented to the author? Request was made during the year, by an author, for copies of his publications. Under existing arrangements the only disposition is by sale, after distribution has been made to the membership and to the exchanges.

2. Is there any policy regarding the reprinting of Special Papers, which are nearing exhaustion? Special Paper No. 15, "Trees of Ohio and Surrounding Territory," by J. H. Schaffner, is almost gone, there being only seven copies in stock. A request for eighteen copies for use in a university had to be turned down.

3. Is the Academy ready to take a further step in the management of its library and turn its collection over to the Ohio State University for incorporation with the other sets and books on scientific subjects?

In the original agreement between the Academy and the University, adopted November, 1914, it was stated in article 3, that "for the time being" the library of the Academy should be kept as a separate collection. This has been done. In article 4, it was stated that "ultimately it is mutually agreed that the library of the Academy shall be classified with, and distributed in the University Library."

The question is: Is the Academy ready to take this step at this time? The University Library is ready.

As bearing on this proposition, the following statements are submitted:

(a) The Ohio Journal of Science is receiving a subsidy from the University. In return for this annual grant, the University Library receives 250 copies of each issue for exchange purposes. At the present time, some 230 societies and periodicals are on the exchange list. Furthermore, the Biological Club has turned over to the University Library all the exchanges received by the Ohio Naturalist from 1900 to 1915. This material has been bound, catalogued and classified by the Library.

(b) Some confusion exists between the two sets of exchanges, those received by the Academy and those received by the Library through the Ohio Journal of Science. If the proposed step is taken, the two sets of exchanges can be unified and duplication eliminated, both in sending and in receiving.

(c) If the proposed step is taken, the duplicates found in the Academy's collection can be used to secure other sets not now in the possession of either the University or the Academy, or they can be sent to other Ohio libraries as the Academy may decide.

(d) The University Library has been purchasing from its book budget, many new sets and filling in the gap in existing sets. If the Academy's collection is turned over, a number of its sets can be completed through purchase, something the Academy cannot afford to do. Furthermore, there will be no chance for duplication or waste in money, when the complete sets are purchased by the University of which the Academy has a partial or incomplete file.

(e) The University Library is unifying other exchanges received and distributed by the University, such as the Ohio History Teacher's Bulletin, the Contributions from the Department of Zoology and Entomology, the Doctoral Dissertations, and the proposed series of studies to be issued by the Graduate School. If the Academy agrees to the proposition put forward, all readjustments can be made while the work is being done on these other series, and the entire question of exchanges can be settled.

(f) The result of favorable action on the part of the Academy will be advantageous to both parties, because the members of the Academy will get improved library facilities through a better handling of its own sets and exchanges and the University Library will be in a better position to unify its collections, to plan its purchase of sets and of "fill ins" and to develop systematically, its entire system of exchanges.

Respectfully submitted,

April 6, 1917.

C. W. REEDER.

Mr. Reeder was requested to make specific recommendations on the subjects treated in this report. This was done at the second business session. In accordance with the recommendations of Mr. Reeder, the following actions were voted by the Academy:

1. That fifty copies of each special publication of which copies are now on hand or which may be published in the future shall be given free to the author. (It is understood that any copies already given shall count on this number.)

2. That the library of the Ohio Academy of Science be turned over to the Ohio State University for incorporation in The Ohio State University General Library.

3. That a special card catalog be kept of the books thus received by the Ohio State University Library from the Academy.

4. That a suitable printed plate, to be paid for by the Academy, be put in the books given to the Ohio State University Library.

Report of the Committee on Legislation

An oral report was presented by the chairman, Dr. Mendenhall. The report was received and the Committee continued.

Report of the Committee on the Ohio Journal of Science

No report was presented. The question at issue has practically solved itself, and the general satisfaction with the present relations of the Academy and the Ohio Journal of Science renders further work by the committee unnecessary.

Report of Committee on Catalog of Scientific Journals

The following report was presented by Mr. Reeder, of the Ohio State University Library, for the Committee on Catalog of Scientific Journals. The report was received and ordered filed.

The Committee on the Union List of Scientific Periodicals begs leave to submit the following report:

Twenty-one Ohio libraries are now pledged to assist in the union catalog. Three additional libraries have agreed to join the movement during the past year—Cincinnati University, Kenyon College, and Otterbein College. Of these co-operating libraries, complete or partial deposits have been made by nine, namely:

Case School of Applied Science.

Kenyon College.

Lloyd Library.

Municipal University of Akron.

Oberlin College.

Ohio Archæological and Historical Society.

Ohio State University Library.

Otterbein College.

Wittenberg College.

All cards so far deposited, have been arranged in one alphabet, after each card has been marked to show the owner library. In order to ascertain the work done during the year by the co-operating libraries which had not made deposits, a request was sent to each one asking for a statement of progress. Following are excerpts from the replies received:

Adelbert College of Western Reserve—Beginning in October, an assistant has given about half-time to the preparation of the records. The periodicals of the Reference Department and the 000 numbers of the Circulating Department are practically completed, making about 350 titles. Work is now proceeding on the 100's.

Antioch College—The librarian expects to get the records completed within a reasonable time.

Cincinnati University—This library contains the exchange deposit of the American Association for the Advancement of Science. Not much, if anything, can be done on the records until the work eases up a little.

Cleveland Public Library—Cards for about 550 titles are ready. These are for such titles as happen to be catalogued or recatalogued, so nothing has been done along any special line.

Hebrew Union College—No progress has been made in the preparation of the records.

Miami University—The staff work has been interrupted by sickness and leaves of absence, so no progress whatever has been made.

Ohio State Library—The larger part of the records of periodicals has been corrected and brought down to date, so the deposit is nearly ready for submission.

Ohio University—Members of the staff have been away, so nothing has been done on the records.

Ohio Wesleyan University—Owing to lack of sufficient staff to give it attention, not much progress has been made. However, the list of cards has been prepared for the bound volumes down to J. It is barely possible that a special worker can be put on these records and complete them in the near future.

Toledo Public Library—Press of work has prevented progress on the records.

Young Men's Mercantile Library Association—Few of our magazine sets have ever been more than arranged on the shelves. Fifty-one sets have been shelf-listed and catalogued and cards for these will be forwarded within the near future. Thirty-four sets have been shelf-listed only and will be catalogued as time permits.

No word was received from the Cincinnati Public Library and Hiram College.

The Academy is aware that the College Section of the Ohio Library Association is co-operating in this work. A full and detailed report was made at its meeting on October, 1916. It was voted at that time to continue the compilation on the lines already laid down and rush the union list to completion as quickly as the time and resources of each individual library permitted.

However, a phase has developed to the Ohio situation which needs thorough consideration. The university libraries of the middle west have projected a Union List which is to include Nebraska, Minnesota, Wisconsin, Iowa, Illinois, Michigan, Ohio and the metropolitan districts of St. Louis and Chicago. The plans for this list have been laid by the H. W. Wilson Co., the estimates of printing made and the copy from nearly all the libraries is ready. Consideration is now being given to the time limit, so the publication may proceed.

Here are some problems for Ohio:

(1) Shall we ask for the inclusion of the Ohio Union list in the proposed "North Central List?"

(2) Is the Academy ready to finance the inclusion of its list, on the basis of what other co-operators will pay?

(3) If the Academy does not finance the proposition, shall we ask each library to finance its own contribution to such a list, or buy its quota of volumes?

(4) When the "North Central List" is published, will there be need for an exclusive Ohio List?

The committee recommends that, in spite of the complication of the situation, work be continued on the distinctively Ohio List and that the relation of the Ohio proposition to that of the universities of the Middle West be held in abeyance until many of the details of the larger union list are definitely settled.

C. W. REEDER.

April 6, 1917.

The following actions were voted by the Academy:

1. That the recommendations contained in the report of the Committee on Catalog of Scientific Journals be adopted.

2. That the Committee on Catalog of Scientific Journals be discharged, and that the work formerly done by this committee be transferred to the Library Committee.

Election of Officers

From the double slate of nominations prepared by the Nominating Committee, the following officers for 1917-18 were elected by the ballot of the Academy:

President—Professor F. L. LANDACRE, Ohio State University, Columbus.

Vice-President for Zoology—Professor C. G. SHATZER, Wittenberg College, Springfield.

Vice-President for Botany—Professor FRED A. DETMERS, Ohio State University, Columbus.

Vice-President for Geology—Professor G. F. LAMB, Mt. Union College, Alliance.

Vice-President for Physics—Professor SAMUEL R. WILLIAMS, Oberlin College, Oberlin.

Vice-President for Anatomy, Physiology, etc.—Professor R. J. SEYMOUR, Ohio State University, Columbus.

Secretary—Professor E. L. RICE, Ohio Wesleyan University, Delaware.

Treasurer—Professor J. S. HINE, Ohio State University, Columbus.

Elective Members of Executive Committee—Professor C. G. SHATZER, Wittenberg College, Springfield; Professor FRANK CARNEY, Denison University, Granville.

Member of Publication Committee—Professor L. B. WALTON, Kenyon College, Gambier.

Trustee of Research Fund—Professor HERBERT OSBORN, Ohio State University, Columbus. (The resignation of Professor M. M. METCALF was presented, and the Chair was instructed to appoint a trustee to fill the vacancy until the next Annual Meeting. Chair appointed Professor M. E. STICKNEY, Denison University, Granville.)

Member of Library Committee—Professor F. O. GROVER, Oberlin College, Oberlin.

On nomination from the floor, the following were elected to represent the Academy on the editorial board of the Ohio Journal of Science:

Zoology—Professor R. A. BUDINGTON, Oberlin College, Oberlin.

Botany—Professor M. E. STICKNEY, Denison University, Granville.

Geology—Professor G. D. HUBBARD, Oberlin College, Oberlin.

Physics—Professor S. J. M. ALLEN, University of Cincinnati, Cincinnati.

Anatomy, Physiology, etc.—Professor F. C. WAITE, Western Reserve University, Cleveland.

Election of Members

The Membership Committee reported ten names for election to membership; one additional name, previously approved by the Executive Committee and marked with * in the following list, was presented for ratification. All were elected, as follows:

Brooks, Clyde, Physiology, Physiological Chemistry, Pharmacology, O. S. U., Columbus.

Cameron, Hazel C., Pathology, 1234 Highland St., Columbus.

*Eggleston, H. Ray, Botany, Zoology, Paleontology; Marietta College, Marietta.

Faulkner, Herbert C., Entomology, Biology; 2 Val. View Boulevard, Ashtabula.

Huber, H. E., Biology; Ohio Northern University, Ada.

Hugger, Carl Claron, Pathology; 710 N. Park St., Columbus.

Kisliuk, Max, Jr., Zoology, Entomology, Botany; Botany and Zoology Bldg., O. S. U., Columbus.

McCaughy, W. J., Mineralogy; Lord Hall, O. S. U., Columbus.

Orcutt, Ruth; Botany, Zoology; Granville.

Speaks, John C., Ichthyology, Ornithology; Columbus.

Yampolsky, Cecil, Botany, Zoology, Genetics; Toledo University, Toledo.

The Report of the Committee on Necrology

The following report was presented by the Committee on Necrology:

Not often does it fall to the Academy to record the loss of two leading members and past officers within one year. Within three days, Sept. 11 and Sept. 14, there occurred the deaths of Professor Charles Smith Prosser and Professor William Rane Lazenby. In many points their lives had run in similar ways; both born as farmer's sons in central New York, both graduates of Cornell University, both of necessity in part working their way through, both retained for a number of years by the University as assistants in their respective fields, both subsequently called to Ohio State University as heads of their respective departments, both loyal members of the Sigma Xi, and both active through their entire scientific careers in painstaking research and conscientious teaching.

Professor Lazenby was born in 1850 at Bellona, N. Y. He was graduated from Cornell University in 1874, at which time he won the Ezra Cornell prize in Agriculture. He was Instructor in Horticulture and Botany, '74-'77 and Assistant Professor, '77-'81 at Cornell; Professor of Botany and Horticulture, '81-'92, of Horticulture and Forestry, '92-'08, and of Forestry at Ohio State University from that date to his death. He was founder and for five years director of the Ohio Experiment Station, an institution which has been a very important factor in the agricultural development of his adopted state.

He was an active member of many scientific organizations, among which are:

- American Association for the Advancement of Science (twice Secretary and once Vice-President of Section I);
- Society Horticultural Science;
- American Pomological Society;
- American Forestry Society (Vice-President many years);
- Society for Promotion of Agricultural Science (Secretary five years and President two years);
- Ohio Academy of Science (founder and President, '02);
- Ohio Forestry Society (President, '04 to date of his death).

His activity in these organizations grew out of a keen interest in them, their members and their ideals, an interest which expressed itself in wise counsel, frequent contributions to their programs, and discussions of the papers of others.

Teaching was his main business during the college year, but his summers were always spent in travel and investigation; several were spent in Europe, studying her forests and forestry methods.

His publications include many contributions both to Scientific Journals and State reports and to the semi-popular and popular press.

In the words of a close friend at Cornell: "While he found his great interest in life, the mastery and development of his special field in science, it was the human side of him that had the strongest hold on his friends and colleagues. He never lost his interest in the struggles

of students with limited means, and in a quiet way extended aid to many of them. He never lost an opportunity for service to his friends or others in need; sympathy, helpfulness and loyalty were his characteristic qualities as a man and friend; and the loss to all of us who knew and loved him is irreparable."—J. H. Comstock, *Science*, December 29, 1916, p. 913.

Hundreds of students now scattered to all parts of the country have sat at his feet, and can testify to the quiet, unassuming scholarship and sympathetic instruction to which they were there exposed. Many have attained to eminence in horticulture and forestry through the working out of the interest and enthusiasm he engendered.

As a member of the Academy he was practically always at its meetings with an important contribution to make. His presentation was always interesting and plain. Continually alert for opportunities by which the Academy could serve the Commonwealth and Science, he became the channel through which we received our annual, financial aid for research from our loyal patron and life member, Mr. Emerson McMillin. He served on the trustee committee from 1901 to the time of his death and wisely discharged his duties.

If any difficult problem arose in the affairs of the Academy he was not lacking in efficient counsel nor was it hastily or injudiciously given. Thus we shall miss his thoughtfulness and wisdom.

Professor Prosser was born in 1860 at Columbus, New York. He was graduated from Cornell University in 1883, was a fellow one year and instructor to 1888; received his master's degree in 1886 and returned twenty years later and took his doctor's degree in 1907. One year before Union College gave him an honorary Doctorate of Science.

He was professor of Natural History at Washburn, Kansas, '92-'94, of Geology at Union, '94-'99, Associate Professor of Historical Geology, '99-'01 at Ohio State University and Professor and Head of the Department from then to the date of his death. For four years after leaving Cornell University he was Assistant Paleontologist on the U. S. Geologic Survey, Assistant Geologist '92-'95 and '00-'16. He was a member of the N. Y. Geological Survey, '95-'99; Kansas Geological Survey, '96, Chief Appalachian Division, Maryland Geological Survey, '98-'01; Assistant Geologist, Ohio Geological Survey, '00-'16.

He was a member of the leading Geological and Scientific Societies of America and of some foreign organizations, among which are the following:

- International Congress of Geologists, London, 1888;
- International Geographic Congress, New York, 1904;
- Fellow American Association Advancement Science (Vice-President, Section E, at the time of his death);
- Society of Naturalists;
- Society of Vertebrate Paleontologists;
- Geological Society of America;
- Paleontological Society of America;
- National Geographic Society;
- Geologische Verein;
- Washington, D. C., Kansas and Ohio Academies of Science.

While teaching was the chief business of Dr. Prosser during practically his whole public life, his vacations and all spare time during the school year were devoted to research. He loved it and was willing to sacrifice much to attain his goals in his scientific career.

His contributions were always marked by most painstaking and precise accuracy in the fields they covered and thus left little for anyone else to do when he had finished.

Among his publications are extensive papers and reports on the geology and paleontology of New York, Maryland, Kansas, and Ohio. They are largely stratigraphic and paleontologic, and are particularly strong in the correlations which they set forth.

The State Geologist of New York, with whom Professor Prosser had long been associated, gives a beautiful estimate of him in the following words:

"There never was a more loyal, a more devoted, a more sensitive spirit. His attitude of mind was puritanic in its simplicity and in its practices, and, left to himself he could never suspect another of indirectness or duplicity—a quality of which he contained not a grain. When confronted by the broader bearings of his science and the natural sequences of its greater propositions, he held himself somewhat carefully aloof. Yet this simplicity of heart which would not let him go far afield, also made him extraordinarily conscientious in his scientific work. It would not be fair to him to say that he had a genius for details, but it would be eminently right to assert that he sought intimately and faithfully for the exact construction of every observation he made so far as that had to do with the theme in hand. This mental method led him to a precision of manner and gave him a certain formality which was seldom dismissed under the most informal circumstances."—J. M. Clarke, *Science*, October 20, 1916, p. 559.

Many men and women have gone out from under his training, in Kansas, New York, and Ohio, who can trace their geological ideals and beginnings to him. Some have attained to eminence in geologic and paleontologic research or in teaching and uphold the high standards to which he was devoted.

(Signed) GEO. D. HUBBARD, *Chairman*,
HERBERT OSBORN.

Report of the Committee on Resolutions

The following report was presented by the Committee on Resolutions, and adopted by the Academy.

1. The Academy wishes again to express its gratitude for the continued generosity of Mr. Emerson McMillin, and to put on record its appreciation of the value of his gifts to the Research Fund in the stimulation and extension of research on the part of the membership of the Academy.

2. The Academy desires to express sympathy for Professor F. O. Grover, whose illness, brought on by overwork, has prevented him from

attending and presiding as president at this meeting. It is to be hoped that he may offer for publication the address he had expected to give.

3. Professor Robert F. Griggs is entitled to the thanks of the Academy for his very interesting illustrated lecture on his recent "Explorations of Mount Katmai, Alaska."

4. The thanks of the Academy are given to Professor James R. Withrow for his timely and valuable lecture on "The Relation of War to Chemistry in America."

5. The Academy thanks the Local Committee and the Professors and Officers of the Ohio State University for providing convenient rooms for the general and sectional meetings and for their efforts in ministering to the comfort of all members in attendance.

6. The Secretary of the Academy, Professor E. L. Rice, deserves much credit for making detailed arrangements for this successful meeting, although other duties have necessitated his absence from the State.

E. L. MOSELEY,

L. B. WALTON,

C. G. SHATZER,

Committee.

Section for Physiology, Anatomy, Bacteriology and Pathology

A petition, signed by sixteen members, was presented, requesting the Academy to establish a new section for Physiology, Anatomy, Bacteriology, and Pathology—the exact name of the section to be determined later.

The petition was granted; and a vice-president and representative upon the Editorial Board of the Ohio Journal of Science were elected for the new section.

Constitution and By-Laws

The Acting President was instructed to appoint a committee of three to codify the Constitution and By-Laws. This committee was requested to consider the desirability of lengthening the terms of office of the president and secretary. (This action to be interpreted as notice of amendment, so that definite action may be taken at the next meeting.)

The Acting President appointed the following committee: Secretary E. L. Rice, ex-officio; F. C. Blake, Frank Carney.

The Academy directed the Executive Committee to print a new edition of the Constitution and By-Laws.

Time Limit for Papers

It was voted by the Academy that, in case titles of papers are sent in without specification of the time needed, a time limit of five minutes shall be set by the Program Committee.

Adjournment

The meeting adjourned without determining the place of the next meeting.

SCIENTIFIC SESSIONS

The complete scientific program of the meeting follows:

Presidential Address

Some Aspects of Present Day Biological Unrest, F. O. GROVER
(Omitted because of the absence of the President)

Lectures

The Relation of War to Chemistry in America,
JAMES R. WITHROW
Recent Explorations of Mount Katmai, Alaska,
ROBERT F. GRIGGS

Papers

1. Eskers in the Dayton Area. 20 min. (Lantern).....AUG. F. FOERSTE
2. The Preservation and Utilization of Wild Life in Ohio. 20 min.
HERBERT OSBORN
3. The Anatomy of an Eight-Legged Pig. 15 min. (Lantern),
STEPHEN R. WILLIAMS
4. The Origin of the "Reserve Cells" (Neoblasts) in the Regeneration of
Tubifex. 15 min. (Lantern).....F. H. KRECKER
5. Prospective and Retrospective Methodology in relation to the Problem
of Evolution. 15 min. (Lantern).....L. B. WALTON
6. Mutations by Interference:—A Study in Heredity. 12 min...A. B. PLOWMAN
7. Drainage Developments in Southeastern Ohio. 20 min...GEO. D. HUBBARD
8. Furs in the Wild and in the Shop. 20 min.....KATHARINE DOORIS SHARP
9. A Suggested Method for the Distinctive Description of Dipterous
Larvæ. 7 min.....C. L. METCALF
10. Additional Records and New Species of Ohio Homoptera. 10 min.
HERBERT OSBORN
11. Some New or Interesting Insect Predators. 10 min.....C. L. METCALF

12. Notes on the Protista:—(a) A New Species of Eutreptia; (b) A New Classification of the Protista. 10 min. L. B. WALTON
13. The Remains of the Porcupine found in an Ohio Prehistoric Village Site. 8 min. WM. C. MILLS
14. Indians of Licking County and Earthworks. 10 min. H. A. ALBYN
15. Suggestions for the Making of a Key to the Seeds and Seed-like Fruits of Ohio Plants. 10 min. JOHN H. SCHAFFNER
16. Ray Tracheids of Conifers. 7 min. FRED A. DETMERS
17. The Nature of Sexual Hereditary Expression in the Sporophyte. 10 min.
JOHN H. SCHAFFNER
18. The Correlation of the Niagara Formations of Ohio, Indiana and Kentucky. 10 min. AUG. F. FOERSTE
19. Pottsville and Allegheny Limestones in Muskingum County, Ohio. 15 min. WILBER STOUT
20. Further Data on the Maxville Limestone. 5 min. G. F. LAMB
21. Bearing of the Glacial Period on Theories of Evolution. 10 min.
G. FREDERICK WRIGHT
22. Some Glacial Features in Central Ohio. 5 min. G. F. LAMB
23. Some Segments of the Maumee Shoreline near Columbus Grove, Ohio. 10 min. (Lantern) FRANK CARNEY
24. A Physiographic Map of North America. 15 min. W. N. THAYER
25. The Nature of *Beatricea undulata*. 5 min. W. H. SHIDELER
26. Symposium on Modern Physics:—
A. Hall Effects in Metals and Alloys,
PROFESSOR A. W. SMITH, Ohio State University
B. Magnetostriction and its Bearing on Magnetic Theories,
PROFESSOR SAMUEL R. WILLIAMS, Oberlin College
C. A Review of Recent Work in X-Rays,
PROFESSOR S. J. M. ALLEN, University of Cincinnati
27. Spermatogenesis of *Branchipus vernalis*. 7 min. ROLLO C. BAKER
28. Origin of Pre-Auditory Ganglia in *Rana*. 7 min. RALPH A. KNOUFF
29. The Origin of Cartilage from Ectoderm in the Urodeles. 10 min.
F. L. LANDACRE
30. Amphibian Blood Transfusion. 10 min. R. A. BUDINGTON
31. Observation on the Cytology of the Exudation seen in Lacunar Tonsillitis. 10 min. HAZEL C. CAMERON
32. A Contribution to the Origin of the Macrophages seen in the Exudation in Pneumonia accompanying Typhoid Fever. 10 min. CARL CLARON HUGGER
33. The Occurrence of Eosinophilic Leucocytes and the Granule Cells of Paneth in the Vermiform Appendix of Man. 5 min. JAMES H. WARREN
34. A Study of the Incidence of Pathological Conditions of the Thyroid Gland among Dogs in the City of Columbus. 10 min. (Lantern),
C. I. REED
35. Nephroblastic Tumors in Rabbits. 10 min. (Lantern) ERNEST SCOTT
36. Notes on the Formation of Giant Cells in Tumors. 5 min.
JONATHAN FORMAN
37. Mudballs and Mudflows in the Ordovician Rocks in the Vicinity of Cincinnati. 10 min. (Lantern) WALTER H. BUCHER

38. Intraformational Pebbles of the Ordovician and Silurian Formations of Ohio. 10 min..... AUG. F. FOERSTL
39. Conditions of Deposition in Devonian and Pennsylvania Times. 10 min. LEWIS G. WESTGATE
40. The Weathering of Wisconsin Gravels in the Little Miami Valley near Cincinnati, Ohio. 10 min..... WALTER H. BUCHER
41. Some More of the Saluda Question. 10 min..... W. H. SHIDELER
42. Lake Abram. 3 min. (Opaque Projection)..... WESLEY N. SPECKMAN
43. Concretionary Forms in Greenfield Limestone. 10 min..... C. W. NAPPER
44. Natural Gas in Ohio. 10 min..... JOHN BOWNOCKER
45. The Radioactivity of Smoke. 10 min..... S. J. M. ALLEN
46. Physical Factors concerned in the Measurement of Blood Pressure. 15 min. (Lantern)..... CLYDE BROOKS
47. The Inheritance of Spotting in Dutch Rabbits. 20 min. (Lantern).  H. D. FISH
48. Unconformity between the Mississippian and Pennsylvanian in the Grand River at Parkman, Ohio. 10 min..... GEO. H. COLTON

Demonstrations

1. A Freak Leptinotarsa decemlineata..... C. L. METCALF
2. Mudballs and Pebbles from the Ordovician Rocks of the Vicinity of Cincinnati, illustrating Paper 37..... WALTER H. BUCHER
3. Pictures and Specimens to illustrate Paper 40, on the Weathering of Wisconsin Gravels..... WALTER H. BUCHER

LEWIS G. WESTGATE,
Acting Sec'y during Meeting,
EDWARD L. RICE,
Secretary.

PROCEEDINGS
OF THE
OHIO
ACADEMY OF SCIENCE

VOLUME VII, PART THREE

Annual Report
Twenty-eighth Meeting



ANNUAL REPORT
OF THE
OHIO ACADEMY OF SCIENCE

Twenty-eighth Meeting
1918

Organized 1891

INCORPORATED 1892

PUBLICATION COMMITTEE
L. B. WALTON J. A. CULLER L. G. WESTGATE

Date of Publication, May 1, 1919

Published by the Academy
Columbus, Ohio

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- 1916- W. C. MILLS
 1916-17. J. A. CULLER
 1916- F. O. GROVER
 1917- C. W. REEDER

Places of Annual Meetings

1891.	Columbus	1905.	Cincinnati
1892.	Columbus	1906.	Columbus
1893.	Columbus	1907.	Oxford
1894.	Columbus	1908.	Granville
1895.	Cincinnati	1909.	Delaware
1896.	Columbus	1910.	Akron
1897.	Columbus	1911.	Columbus
1898.	Columbus	1912.	Columbus
1899.	Cleveland	1913.	Oberlin
1900.	Columbus	1914.	Columbus
1901.	Columbus	1915.	Columbus
1902.	Columbus	1916.	Columbus
1903.	Granville	1917.	Columbus
1904.	Cleveland	1918.	Columbus

MEMBERSHIP

December 1, 1918.

(Date of admission to the Academy shown by numerals preceding names. Members marked as admitted in 1891 are Charter Members.)

LIFE MEMBER

- '92. McMILLIN, EMERSON.....Mahwah, N. J.

ACTIVE MEMBERS

- '98. AIKEN, W. H.....Station K, Cincinnati
 '91. ALBRIGHT, CHARLES E.....176 Webster Park Ave., Columbus
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 '12. ALLEN, S. J. M., *Physics*.....Univ. of Cincinnati, Cincinnati
 '13. ANKENLY, WM. N., *Botany*.....Bureau Plant Industry, Washington, D. C.
 '12. ATKINSON, A. A., *Physics and Allied Subjects*.....Ohio Univ., Athens
 '07. BALES, B. R., *Ornithology, Entomology*.....149 W. Main St., Circleville
 '04. BALL, E. D., *Entomology*.....Dept. of Zoology and Entomology, Ames, Iowa
 '13. BARNEIT, S. J., *Physics*
 Dept. of Terrestrial Magnetism, Carnegie Institute, Washington, D. C.
 '09. BARROWS, WILLIAM M., *Experimental Zoology*.....O. S. U., Columbus
 '18. BASINGER, ALMON J., *Entomology, Zoology, Botany*.....Columbiana
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 East Technical H. S., Cleveland
 '05. BENEDICT, H. M., *Zoology*.....Univ. of Cincinnati, Cincinnati
 '99. BERGER, E. W., *Zoology*.....Gainesville, Florida
 '12. BEVAN, ARTHUR, *Geology*.....Orton Hall, O. S. U., Columbus
 '01. BLACK, J. G., *Geology*.....R. D. No. 10, Wooster
 '12. BLAKE, FREDERICK C., *Physics*.....O. S. U., Columbus
 '91. BLEILE, ALBERT M., *Physiology, Biology*.....O. S. U., Columbus
 '96. BOWNOCKER, JOHN A., *Geology*.....O. S. U., Columbus
 '05. BRAAM, MAXIMILIAN, *Zoology, Botany*.....Hughes High School, Cincinnati
 '15. BRADFIELD, R. M., *Botany, Chemistry*.....Lilly Chapel
 '09. BRAUN, ANNETTE F., *Zoology*.....2702 May St., Cincinnati
 '05. BROOKOVER, CHARLES, *Zoology*, Medical Dept., Univ. of Louisville,
 Louisville, Ky.
 '17. BROOKS, CLYDE, *Physiology, Physiological Chemistry, Pharmacology*,
 O. S. U., Columbus
 '01. BRUGGER, HARVEY, *Botany*.....206 S. Wood St., Fremont
 '11. BRYANT, E. R., *Biology*.....New Concord
 '99. BUBNA, MATTHIAS, *Entomology*.....2629 Woodhill Road, Cleveland
 '13. BUCHER, WALTER H., *Geology, Physics*,
 Dept. of Geology, Univ. of Cincinnati, Cincinnati
 '08. BUDINGTON, R. A., *Zoology, Physiology*.....O'ardin

- '08. FOX, CHARLES P., *Botany, Chemistry*.....395 Doyle St., Akron
 '12. FOX, ERROL, *Botany, Chemistry*.....395 Doyle St., Akron
 '04. FULLMER, E. L., *Botany*.....Berca
 '10. GOODRICH, CALVIN, *Conchology*.....Detroit Journal, Detroit, Mich.
 '13. GOWDY, ROBERT CLYDE, *Physics*.....2115 Auburn Ave., Cincinnati
 '12. GRABER, M. E., *Physics*.....Tiffin
 '97. GRABER, PHILIP E., *Physics, Chemistry, General Science*,
 9501 Pratt Ave., Cleveland
 '99. GRIGGS, R. F., *Botany*.....O. S. U., Columbus
 '99. GROVER, F. O., *Botany*.....270 Elm St., Oberlin
 '17. GULLUM, FRANK B., *Chemistry, Physics*...237 E. Northwood Ave., Columbus
 '15. GUYTON, THOMAS C., *Entomology*,
 Dept. of Agriculture, Bureau of Zoology, Harrisburg, Pa.
 '11. HALLIHAN, THOS. H., *Entomology*.....212 Madison Ave., Paterson, N. J.
 '01. HAMBLETON, J. C., *Botany, Zoology*.....Galloway
 '15. HANAWALT, F. A., *Biology*.....High School, Canton
 '05. HANSEN, MRS. HERMINA Z., *Biology*.....41 N. Portage Path, Akron
 '15. HARMOUNT, GEORGE P., *Geology, Archeology*, 2290 Indianola Ave., Columbus
 '15. HENDERSON, CHARLES W., *Physics*.....Granville
 '15. HENDERSON, NELLIE F., *Botany*.....Martin's Ferry
 '03. HERMS, W. B., *Zoology*.....Univ. of California, Berkeley, Cal.
 '18. HERRICK, FRANCIS H., *Animal Behavior, Life and Instincts of Birds*,
 Western Reserve Univ., Cleveland
 '11. HILLS, T. M., *Geology*.....O. S. U., Columbus
 '91. HINE, J. S., *Entomology, Ornithology*.....O. S. U., Columbus
 '15. HOLT, W. P., *Geography, Geology, Zoology, Botany*,
 Normal College, Bowling Green
 '99. HOPKINS, LEWIS S., *Botany*.....Kent
 '12. HORMELL, W. G., *Physics*.....Delaware
 '06. HOUSER, J. S., *Entomology*.....Wooster
 '05. HUBBARD, G. D., *Geology, Physiography*.....Oberlin
 '17. HUBER, H. E., *Biology*.....Ohio Northern Univ., Ada
 '17. HUGGER, CARL CLARON, *Pathology*.....710 N. Park St., Columbus
 '12. HUMPHREY, LILLIAN E.....Ironton
 '05. HYDE, J. E., *Geology*.....Adlebert College, Cleveland
 '12. ICKES, MARGUERITE, *Zoology*.....12582 Clifton Blvd., Cleveland
 '13. IRWIN, OSCAR W., *Physics*.....Toledo Univ., Toledo
 '01. JENNINGS, O. E., *Botany*.....Carnegie Museum, Pittsburgh, Pa.
 '14. JOHNSON, E. H., *Physics*.....Gambier
 '94. JONES, LYNDS, *Ornithology*.....College Museum, Oberlin
 '09. KING, J. LIONEL, *Botany, Entomology*...Dept. Agriculture, Harrisburg, Pa.
 '15. KIRK, JOSEPH M., *Meteorology, Geology, Physics*,
 321 E. Nineteenth Ave., Columbus
 '17. KISLIUK, MAX, JR., *Zoology, Entomology, Botany*,
 Gov. Laboratory, Clarkesville, Tenn.
 '10. KNOWER, HENRY MCE., *Anatomy, Biology*,
 Medical College, Univ. of Cincinnati, Cincinnati
 '12. KOSTIR, WENCEL J., *Zoology*.....O. S. U., Columbus
 '09. KRECKER, FREDERICK H., *Zoology*.....O. S. U., Columbus

- '13. KUMLER, RALPH W., *Geology, Physiography*.....61 Clay St., Tiffin
- '14. KURTZ, S. AARON, *Botany, Geology, Physics, Chemistry, Archeology*,
525 Rogers St., Bucyrus
- '12. LAKE, CHAS. H., *Physics*.....Cleveland
- '09. LAMB, G. F., *Geology*.....233 Hartshorn St., Alliance
- '06. LANDACRE, F. L., *Zoology*.....O. S. U., Columbus
- '08. LIBRARY, OHIO STATE UNIVERSITY.....Columbus
- '91. LLOYD, JOHN URI.....Court and Plum Sts., Cincinnati
- '15. LORD, H. C., *Astronomy, Mathematics*.....O. S. U., Columbus
- '18. LOWRY, PHIL R., *Entomology, Zoology*.....1597 Hunter Ave., Columbus
- '15. LUTZ, DEXTER, *Biology, Agriculture, Meteorology*,
Fisk Univ., Nashville, Tenn.
- '10. MARK, CLARA GOULD, *Geology, Botany*.....Westerville
- '93. MATHEWS, MARY E.....Painesville
- '10. McAVOY, BLANCHE, *Biology*.....Box 56, Sta. F., Foley Road, Cincinnati
- '06. McCAMPBELL, EUGENE F., *Bacteriology*...State Board of Health, Columbus
- '16. McCLOY, JAMES H., *Physics*.....Westerville
- '91. McFADDEN, L. H., *Chemistry*.....1071 Salem Ave., Dayton
- '06. McKEAN, T. L., *Botany*.....Berea
- '14. McPHERSON, WM., *Chemistry*.....O. S. U., Columbus
- '14. MECKSTROTH, GUSTAV A., *Botany, Entomology*,
Bureau of Plant Industry, Washington, D. C.
- '12. MENDENHALL, T. C., *Physics*.....Ravenna
- '00. MERCER, W. F., *Biology*.....Ohio University, Athens
- '09. METCALF, C. L., *Entomology, Zoology*,
Dept. of Zoology and Entomology, O. S. U., Columbus
- '08. METCALF, M. M., *Zoology*.....Oberlin
- '03. METCALF, ZENO P., *Ornithology*.....A. & M. College, W. Raleigh, N. C.
- '14. METZGER, ALBERT C. D., *Chemistry, Ornithology, Geography*,
380 Deshler Ave., Columbus
- '98. MILLS, W. C., *Archeology, Biology*.....O. S. U., Columbus
- '18. MITCHELL, ROGER I., *Entomology*.....Sta. 6, Route 6, Columbus
- '13. MOORE, E. J., *Physics*.....Oberlin College, Oberlin
- '12. MORE, LOUIS T., *Physics*.....Univ. of Cincinnati, Cincinnati
- '14. MORNINGSTAR, HELEN, *Geology*.....1275 Franklin Ave., Columbus
- '06. MORSE, W. C., *Geology*.....Washington Univ., St. Louis, Mo.
- '91. MOSELEY, E. L., *Zoology, Botany, Physiography*,
State Normal College, Bowling Green
- '13. MOTE, DON C., *Zoology, Entomology*.....Wooster
- '15. NAPPER, CHARLES W., *Geology*.....Greenfield
- '05. NELSON, JAMES A., *Zoology, Embryology*.....Mt. Vernon
- '09. NICHOLS, SUSAN P., *Botany*.....257 Elm St., Oberlin
- '93. OBERHOLSER, H. C.....2805 Eighteenth St., N. W., Washington, D. C.
- '99. ODENBACH, F. L., *Meteorology*.....St. Ignatius College, Cleveland
- '16. OKEY, CATHERINE W., *Anatomy, Zoology*.....514 Butler St., Marietta
- '13. O'NEAL, CLAUDE E., *Botany*.....Delaware
- '17. ORCUTT, RUTH, *Botany, Zoology*.....Granville
- '98. OSBORN, HERBERT, *Entomology, Zoology*.....O. S. U., Columbus

- '96. OSBURN, RAYMOND C., *Zoology, Ichthyology*,
Botany and Zoology Bldg., O. S. U., Columbus
- '08. PARKHURST, C. P., *Science*.....9 West Long St., Columbus
- '18. PARKS, F. H., *Entomology*...Botany and Zoology Bldg., O. S. U., Columbus
- '14. PHILLIPS, RUTH L., *Biology and Allied Sciences*....Western College, Oxford
- '93. PIWONKA, THOMAS.....226 Superior Ave., N. W., Cleveland
- '15. PLOWMAN, AMON B., *Botany, Physiology, Zoology*..126 S. Maple St., Akron
- '15. PRATT, DELBERT R., *Botany, Zoology, Bacteriology*...560 Cherry St., Akron
- '12. PROSE, CHAS. T., *Physics*.....1333 Maple Ave., Zanesville
- '12. RANKIN, JOHN P., *Biology, Medicine*.....415 Earl Court, Elyria
- '13. RECKER, PAUL C., *Biology, Physics, Chemistry*,
South High School, Cleveland
- '16. REED, CARLOS I., *Physiology*.....710 N. Park St., Columbus
- '16. REEDER, C. W.....Library, O. S. U., Columbus
- '14. REESE, CHAS. A., *Zoology, Entomology*.....Morgantown, W. Va.
- '01. RICE, EDWARD L., *Zoology*.....Delaware
- '14. ROBINSON, J. M., *Entomology*.....Dept. Entomology, Raleigh, N. C.
- '13. ROGERS, CHARLES G., *Physiology*.....Oberlin College, Oberlin
- '14. ROOD, ALMON N., *Botany*.....R. F. D. No. 2, Phalanx Station
- '00. ROUDEBUSH, LOWELL.....R. F. D. No. 3, New Richmond
- '10. RUSH, R. C., *Conchology*.....Hudson
- '18. SAMPSON, HOMER C., *Botany*.....O. S. U., Columbus
- '02. SANDERS, J. G., *Entomology, Botany*...Dept. of Agriculture, Harrisburg, Pa.
- '97. SCHAFFNER, J. H., *Botany*.....O. S. U., Columbus
- '13. SCHEAR, E. W. E., *Biology*.....107 W. Park, Westerville
- '07. SCHEFFEL, EARL R., *Geology*.....341 River St., Dayton
- '12. SCHROYER, CHARLES R., *Geology*,
U. S. Geological Survey, Washington, D. C.
- '15. SCOTT, EDWARD B., *Meteorology, Botany*.....1894 Summit St., Columbus
- '16. SCOTT, ERNEST, *Pathology*.....Medical College, N. Park St., Columbus
- '15. SEARS, PAUL B., *Botany, Entomology*.....O. S. U., Columbus
- '91. SELBY, A. D., *Botany*.....Experiment Station, Wooster
- '14. SEYMOUR, RAYMOND JESSE, *Physiology, Zoology, Botany*,
Dept. Physiology, O. S. U., Columbus
- '12. SHADLE, ALBERT, *Zoology*....Zool. Laboratory, Cornell Univ., Ithaca, N. Y.
- '11. SHARP, MRS. KATHARINE DOORIS, *Botany, Geology*....60 N. Main St., London
- '08. SHATZER, C. G.....25 E. Cecil St., Springfield
- '08. SHAW, N. E., *Entomology*.....State House, Columbus
- '13. SHEARD, CHARLES, *Physics*.....367 W. Tenth Ave., Columbus
- '15. SHETRONE, H. C., *Archeology*....Museum and Library Building, Columbus
- '13. SHIDELER, W. H., *Geology*.....Oxford
- '10. SHILLIDAY, C. L., *Zoology*.....University of Buffalo, Buffalo, N. Y.
- '15. SHUMAN, S. C., *Botany*.....New Madison
- '13. SHUMAN, W. L., *Botany*.....Chicago Junction
- '09. SIM, ROBERT J., *Ornithology, Zoology*.....Jefferson
- '08. SMITH, ARTHUR L., *Geology*.....Valley Crossing
- '02. SNYDER, F. D., *Zoology, Ethnology*.....Ashtabula
- '17. SPEAKS, JOHN C., *Ichthyology, Ornithology*.....Columbus
- '12. SPECKMAN, W. N., *Geology*.....New Lyme

- '18. SPOHR, CARL F., *Medical Sciences*.....Medical Dept., O. S. U., Columbus
 '12. STANLEY, CLYDE M., *Zoology*.....High School, Alliance
 '05. STAUFFER, CLINTON R., *Geology*.....Univ. of Minnesota, Minneapolis, Minn.
 '16. STEHLE, MABEL E., *Zoology, Entomology*.....100 Mithoff St., Columbus
 '91. STERKI, VICTOR, *Conchology, Botany*.....New Philadelphia
 '03. STICKNEY, M. E., *Botany*.....Granville
 '15. STOUT, HARRY O., *Botany, Geology, Agriculture, Zoology*,
 606 E. State St., Fremont
 '08. STOUT, W. E., *Chemistry, Ceramics, Geology*....40 E. Lane Ave., Columbus
 '09. STOVER, W. GARFIELD, *Botany*.....O. S. U., Columbus
 '03. SWEEZEY, OTTO H.....Twelfth Ave., Honolulu, Hawaii
 '14. THAYER, WARREN N., *Geology*.....Ohio Mechanics Institute, Cincinnati
 '15. THOMAS, ROY C., *Botany, Zoology, Geology*.....R. F. D. 5, Mt. Gilead
 '94. TODD, JOSEPH H., *Geology, Archeology*.....Christmas Knoll, Wooster
 '15. TRANSEAU, EDGAR N., *Botany*.....O. S. U., Columbus
 '15. TROTT, T. ELMER, *Mathematics, Astronomy*...2221 Ridgewood Ave., Alliance
 '18. TUCKER, W. M., *Geology*.....Dept. of Geology, O. S. U., Columbus
 '12. UNNEWEHR, EMORY C., *Physics*.....Baldwin-Wallace College, Berea
 '15. VAN CLEVE, M. R., *Physical Geography, Botany*....542 Ardin Place, Toledo
 '14. VERWIEBE, WALTER A., *Geology*....Roxana Petroleum Co., Tulsa, Oklahoma
 '15. VIVIAN, ALFRED, *Agriculture, Chemistry*.....O. S. U., Columbus
 '04. WAITE, F. C., *Anatomy, Zoology*.....1353 E. Ninth St., Cleveland
 '18. WALLER, A. E., *Botany, Agronomy*.....Dept. of Botany, O. S. U., Columbus
 '02. WALTON, L. B., *Biology*.....Gambier
 '16. WARREN, JAMES H., *Anatomy*..Medical College, 710 N. Park St., Columbus
 '98. WEBB, R. J., *Botany*.....Garrettsville
 '11. WELLS, B. W., *Botany*.....Grubbs Vocational College, Arlington, Tex.
 '96. WERTHNER, WILLIAM B., *Botany*.....Steele High School, Dayton
 '01. WESTGATE, LEWIS G., *Geology*.....Delaware
 '18. WICKLIFF, E. L., *Zoology, Ornithology*.....Columbus
 '15. WILLIAMS, JOHN N., *Mathematics, Physics, Chemistry*,
 227 W. Reynolds St., Urbana
 '13. WILLIAMS, SAMUEL R., *Physics*.....Oberlin College, Oberlin
 '03. WILLIAMS, STEPHEN R., *Biology*.....Miami University, Oxford
 '97. WILLIAMSON, E. B., *Entomology*.....Bluffton, Ind.
 '08. WILSON, STELLA S., *Geography, Geology*.....Station B, Route 7, Columbus
 '14. WILTBERGER, P. B., *Entomology, Zoology*,
 Michigan Agricultural College, E. Lansing, Mich.
 '15. WITHROW, JAMES R., *Chemistry, Mineralogy*.....O. S. U., Columbus
 '92. WRIGHT, G. FREDERICK, *Geology*.....Oberlin
 '15. WYKOFF, HARRY S., *Biology, Botany*.....Station A, No. 4, Alliance
 '17. YAMPOLSKY, CECIL, *Botany, Zoology, Genetics*.....Toledo Univ., Toledo
 '03. YORK, HARLAN H., *Botany*.....Brown Univ., Providence, R. I.
 '15. YOST, RALPH, *Genetics, Botany, Bacteriology*.....Box 81, Thornville
 '06. YOUNG, R. A., *Botany*.....120 Chestnut Ave., Takoma Park, D. C.

Total Membership—245.

REPORT

OF THE

TWENTY-EIGHTH ANNUAL MEETING

OF

THE OHIO ACADEMY OF SCIENCE

The Twenty-eighth Annual Meeting of the Ohio Academy of Science was held at Ohio State University, Columbus, Ohio, May 30 to June 1, 1918, under the presidency of Professor Francis L. Landacre. Forty-seven members were registered as in attendance; ten new members were elected.

After adjournment of the formal sessions, the botanists and zoologists went on an automobile excursion to the picturesque and ecologically interesting Sugar Grove region, and the geologists took a longer trip for the study of the rock series (Niagara to Carboniferous) and topography between Hillsboro and the Scioto River.

GENERAL PROGRAM

THURSDAY, MAY 30.

10:30 A. M.—Business Meeting.

12:30 P. M.—Luncheon.

2:00 P. M.—Reading of Papers, General Session.

4:00 P. M.—Demonstrations.

6:00 P. M.—Dinner, followed by Address of the President, Professor Francis L. Landacre, Ohio State University, "The Origin of the Cerebral Ganglia of the Vertebrates."

FRIDAY, MAY 31.

9:00 A. M.—Reading of Papers, Sectional Session.

12:30 P. M.—Luncheon.

2:00 P. M.—Adjourned Business Meeting.

3:00 P. M.—Reading of Papers, Sectional Session.

6:00 P. M.—Supper.

7:30 P. M.—Symposium: "Science and the War"—

"The Work of the Ground Schools in the Training of the Air Forces of the United States," Professor F. C. Blake.

"Modern Methods of Plant Disease Control," Professor W. G. Stover.

"Psychological Tests in the Army," Captain George F. Arps.

"Methods of Teaching the Theory of Flight in Schools of Aeronautics," Professor H. C. Lord.

"Topography and the War on the Western Front," Professor T. M. Hills.

"The Newer Demands on Physics and Physics Teachers Due to the War," Professor E. H. Johnson.

SATURDAY, JUNE 1.

Excursions.

MINUTES OF BUSINESS MEETINGS

The first business session was called to order by President Landacre at 10:30 A. M., on Thursday, May 30. An adjourned session was held at 2:00 P. M. on the following day.

The appointment of the following committees for the meeting was announced by the chair:

Committee on Membership—R. C. Osburn, F. C. Blake, R. J. Seymour.

Committee on Resolutions—M. M. Metcalf.

Committee on Necrology—A. M. Bleile.

The following Auditing Committee was elected by the Academy: F. C. Blake, E. N. Transeau.

The following Nominating Committee was elected by the ballot of the Academy: T. C. Mendenhall, L. G. Westgate, F. L. Landacre.

Report of the Secretary

The following report by the Secretary was received and ordered filed:

DELAWARE, OHIO, May 29, 1918.

To the Ohio Academy of Science:

The work of the Secretary has consisted largely in the usual routine correspondence and in the carrying out of the directions of the Executive Committee, as noted in the report of that committee.

The report of the Twenty-seventh Annual Meeting was prepared rather unusually promptly and forwarded to *Science*. Its fate is shown by the following quotation from a letter by Professor Cattell, Editor of *Science*, under date of August 30:

"Owing to a necessary reduction in the size of the journal, it has been very much overcrowded this year and it has seemed impossible to find space for the report. I hope that the reduction in the size of *Science* is only temporary and that you will be so kind as to send me the report of next year's meeting."

The report will be prepared in case its publication is assured.

Notices of the Twenty-eighth Annual Meeting have been sent to the leading Columbus dailies with a request for publicity; but it has seemed hardly worth while to send such notices to Cleveland, Cincinnati and Toledo papers, as in the past. If the Academy so desires, notices will next year be sent to the larger list of papers.

A number of officers and committee members have this year been prevented from carrying out their work for the Academy. Professor Lamb has been compelled by ill health to give up the Vice-presidency for Geology, and Professor Westgate has been acting in his place. Professor Carney's new duties have taken him away from the State so much of the time that it has been impossible for him to serve with either the Executive Committee or the Committee on Codification of the Constitution. The Secretary has also received word from Professor Waite of his appointment as Captain in the Surgeon General's office and his inability to take any active part in the work of the Editorial Board of the Ohio Journal of Science. And at the last moment a letter from Professor Samuel R. Williams announces that he will be prevented from attending the meeting because of serious illness in his household; Professor Moore will be present to serve in his stead.

The members of the Academy may be interested in two rather conspicuous, but perhaps unconscious, changes in policy regarding the meeting place. During the decade, 1891-1900, all but two meetings were held in Columbus; during the next decade only three meetings were held in Columbus; since 1900 seven of the eight meetings (including the present session) have been held in Columbus. Since 1913 no invitation has been received except the cordial and generous standing invitation from the State University. There can hardly be a question that Columbus is the most generally convenient and desirable place for the meetings of the Academy. On the other hand, it may be worth careful consideration whether an occasional meeting in some other city does not aid in stimulating interest in the Academy throughout the State.

Finally the Secretary wishes to raise another question of policy. Is it not time for the Academy to establish a permanent headquarters in Columbus, to which all Academy mail may go, and from which all Academy business may be transacted? If the time is not ripe for this action, the Secretary would recommend, at least, that the new secretary be elected from Columbus, to facilitate closer co-operation with the Treasurer and with Mr. Reeder of the Library. Partly for this reason, and partly for personal reasons, the present secretary would request the Nominating Committee to omit his name from the list of nominations to be presented at the second business session of this meeting.

Respectfully submitted,

EDWARD L. RICE, *Secretary*.

The recommendations of the Secretary relative to place of meeting and establishment of a permanent Academy headquarters were referred to a special committee for consideration and report to the Academy. The committee reported as follows:

1. With reference to the place of meeting, the committee is of the opinion that the present practice of the Academy, of meeting as a general thing in Columbus, but leaving the way open to meet at other places in the State when occasion offers, should be continued.

2. With reference to the establishment of a permanent headquarters for the Academy at Columbus, from which all Academy business may be transacted, the committee has no recommendation to offer.

Respectfully submitted,

STEPHEN R. WILLIAMS,
L. G. WESTGATE,
C. G. SHATZER.

Report of the Treasurer for the Year 1917-18

The report of the Treasurer was received as follows, and referred to the Auditing Committee, whose report is appended.

For the year since our last annual meeting, the receipts including balance from last year, have amounted to \$474.20, and the expenditures to \$272.85, leaving a cash balance of \$201.35.

RECEIPTS

Balance from last year.....	\$139.10
For sale of publications.....	32.10
Membership dues.....	303.00
	\$474.20

EXPENSES

Miscellaneous expenses.....	\$ 70.85
202 subscriptions to the Ohio Journal of Science.....	202.00
Balance, May 30, 1918.....	201.35
	\$474.20

Respectfully submitted,

JAS. S. HINE, *Treasurer*.

May 30, 1918.

The Auditing Committee has verified the receipts and expenditures of the Treasurer of the Academy, Professor J. S. Hine, and finds that they are correct.

E. N. TRANSEAU,
F. C. BLAKE.

Report of the Executive Committee

The report of the Executive Committee was received as follows and ordered filed.

DELAWARE, OHIO, May 27, 1918.

To the Ohio Academy of Science:

A single meeting of the Executive Committee has been held since the last Annual Meeting—on December 8, 1917. Professors Landacre, Hine, Shatzer and Rice were in attendance. Following the custom of the last few years, all officers and chairmen of standing committees were invited to meet with the Executive Committee. Vice-Presidents Detmers and Seymour responded to this invitation.

The place and date of the Annual Meeting were determined; and the Program Committee was requested to arrange, if possible, for field trips on Saturday, June 1, and to give an increased prominence to the item of demonstrations in the program for the meeting. Both suggestions have borne fruit. It is now left for the Academy to prove the fruit in the eating.

There was some discussion of the propriety of the Academy paying the travelling expenses of the members of the Executive Committee in attending meetings and the clerical, printing and postage bills incurred by members of the Program Committee in arranging the program. The Executive Committee was not ready to make any formal recommendation in this matter.

The Secretary was authorized to have a set of the Annual Reports of the Academy bound for the use of present and future secretaries. (Steps have been taken by the Secretary, in conference with Mr. Reeder, to carry out this action.)

The Secretary was instructed to take up with Mr. Reeder the matter of exchanges with the Marine Biological Laboratory, Woods Hole, Mass., and to secure, if practicable, the placing of a complete set of the Proceedings in the Library of the Laboratory. (Consultation with Mr. Reeder showed that the Academy had expressed its willingness to supply the Laboratory with lacking numbers of the Academy publications, but that no reply had been received).

The Secretary was also instructed to renew correspondence looking toward the establishment of a Section for Psychology in the Academy. (A questionnaire concerning the desirability of this section was mailed to a number of the leading psychologists of the State; the consensus of opinion was strongly in favor of the establishment of the section, but equally strongly against attempting this action at this time, when the psychologists are so generally in national service).

In view of the action of the last Annual Meeting, looking toward amendment, the Executive Committee has postponed the re-printing of the Constitution and By-Laws ordered by the Academy.

The question was raised by several members of the Academy whether war conditions made it desirable to omit this year's Annual Meeting. This question was carefully considered by the Executive Committee by correspondence. The practically unanimous decision was that the demand of patriotism was for holding the meeting rather than for omitting it, even if the attendance might be materially decreased.

An invitation was received by the Ohio Academy to send a delegate to the Semi-Centennial Anniversary of the Kansas Academy of Science, celebrated on March 15 and 16. After consultation by mail, the Executive Committee directed the Secretary to communicate our congratulations to the Kansas Academy and to request Professor G. E. Coghill, of the University of Kansas, a member of the Ohio Academy from 1907 to 1915, to act as our representative. (This was done by night letters, under date of March 13).

Respectfully submitted,

EDWARD L. RICE,

Secretary for the Committee.

Report of the Publication Committee

No report of the Publication Committee was presented.

Report of the Trustees of the Emerson McMillin Research Fund.

The following report of the Trustees of the Research Fund was received and referred to the Auditing Committee, whose report is appended.

May 30, 1918.

RECEIPTS

Balance April 1, 1917.....	\$778.64	
March 15, 1918, from Mr. McMillin.....	250.00	
		\$1,028.64

EXPENDITURES.

For Research:

Geo. D. Hubbard.....	\$ 22.32	
E. L. Rice.....	55.40	
L. B. Walton.....	37.40	
		115.12

Balance in Bank.....	\$ 913.52
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GRANTS.

L. B. Walton.....	\$ 75.00	
E. N. Transeau.....	75.00	
E. L. Rice.....	55.40	
H. W. Lutz.....	25.00	
		\$ 230.40
Paid on above grants.....	92.80	
Liability on grants.....		\$ 137.60
Net assets.....		\$ 775.92

HERBERT OSBORN,
T. C. MENDENHALL.

May 30, 1918, audited and found correct.

E. N. TRANSEAU,
T. C. BLAKE,
Auditing Committee.

In addition to the financial report for the year, the Trustees presented the following announcement concerning the use of the McMillin Research Fund, which was approved by the Academy.

The McMillin Research Fund of the Ohio Academy of Science has been maintained through the generosity of Emerson McMillin and grants from this fund are made upon application to the Trustees of the fund.

Applications for grants should include a statement of the subject to be investigated, the nature of the expenses to be covered and in so far as practicable a list of the proposed items of expense in such manner that the Trustees may determine the expenses and the allowance needed.

In rendering accounts it is desirable that an itemized statement be submitted, showing the cost of apparatus or supplies used, or, in case of traveling expenses, the localities visited, amounts of railroad fare, hotel and other expenses as incurred. Payments granted from this fund will, as a rule, be made only after the expenses have been incurred and upon receipt of detailed statement. Original vouchers should be furnished when possible.

Apparatus, books, maps or material supplies not consumed during the investigation, which may be secured with grants from this fund are to be the property of the Academy and after the investigation is completed should be accounted for to the Trustees or deposited with such officer of the Academy as the Trustees may direct.

It is expected that the results of such investigations will be published and if other means of publication are not available, the Trustees will try to assist in securing suitable publication.

T. C. MENDENHALL, *Chairman.*

The Trustees further reported to the Academy a proposal to invest five hundred dollars of the Research Fund in Liberty Bonds, subject to the approval of Mr. McMillin. The Academy voted its hearty endorsement of this proposal.

Report of the Library Committee

For the Library Committee, Mr. Reeder, of the Ohio State University Library, presented the following report, which was received and ordered filed.

May 30, 1918.

To the Ohio Academy of Science:

At the last meeting of the Academy, it was voted to turn over to the University Library for incorporation in its collection, the materials received through exchanges by the Academy. In accordance with this action, the work of the year has been the unifying of these files. A

sheet record has been made of the collections of the Academy as they stood at the time of transfer. As opportunity presented, the University Library has taken these sets and checked them. If needed in the Library, these sets, or individual items, have been added; if not needed, the material has been added to the duplicate collections for exchange purposes. In case any binding has been done, the volumes have been marked with the special book-plate which the Academy authorized at its last meeting. If it had not been for the absence of the Librarian on war work, this process of incorporation would have been completed by this date, but a portion of it will have to go over into this coming year.

In connection with the general policy of increasing exchanges, the University Library has been able to add new names to the list of the Academy. The combination of the Ohio Journal of Science, the Bulletins of the Ohio Biological Survey and the Proceedings of the Ohio Academy of Science makes a series of sets that command attention and of sufficient value to give a good basis for arranging terms of exchange. During the year several libraries and societies have completed their sets of the Special Papers and Annual Reports of the Academy on an exchange basis.

The only publication issued by the Academy during the year was the Annual Report of the Twenty-seventh Meeting, April 6 and 7, 1917. This report was mailed to the membership list as printed in that report and to all exchanges on the list.

The sale of publications during the year amounted to \$24.35. This sum has been turned over to the Treasurer.

In accordance with the recommendation of the Executive Committee, a complete set of Annual Reports Nos. 1-25, have been bound for use of the Secretary.

At the last meeting of the Academy the Committee on Catalog of Scientific Journals was discharged and the work turned over to the Library Committee. This proposition stands today about in the same situation as at the time of the last report, with two exceptions: (1) Oberlin College has added about 3,000 cards to the Catalog during the year; and (2) the Catalog itself has been placed in order and now occupies ten (10) trays in the catalog in the University Library.

C. W. REEDER.

Report of the Committee on Legislation

The following report of the Committee on Legislation, presented by the chairman, Dr. Mendenhall, was received and ordered filed.

In presenting what may be considered as a preliminary report or what may be considered as a report of progress your committee regrets to say that circumstances have made it impracticable to meet for thorough discussion of the questions that might arise and that therefore the suggestions offered must be considered as tentative and that suggestions or instructions along any of the lines mentioned will be

welcomed. Since there is not likely to be another meeting of the Academy before the next Assembly meets, some direction or indication of the wishes of the Academy will be of special value.

There has been no session of the Assembly since our last meeting and therefore no presentation of our wishes has been possible.

It appears to the committee that desired legislation may be sought along two lines; first, to provide funds for the Academy to undertake definite researches along special lines and to provide a fund for the publication of the proceedings of the society; second, to secure such legislation as may connect the Academy in an advisory capacity with the State in regard to matters of scientific importance requiring technical scientific information, and which the membership of the Academy is qualified to give.

For the first purpose it seems that the most probable fund might be one providing for publication either directly by state printing, with perhaps, a limitation of say 500 pages per year or a direct appropriation, to be expended by the Society for publication purposes. Such a request might be the first to urge, and then a request for the appropriation of a research fund, to be expended under the direction of the Trustees of the Research Fund of the Academy in such an amount as might be deemed essential for the investigations proposed.

For the second general purpose, there would seem to be necessary an act creating an advisory committee within the Academy, with power to form sub-committees for specific problems, especially with reference to needed legislation along lines within the scope of the Academy. Such, for example, as legislation concerning conservation and utilization of natural resources of the state, the protection of forests, the development of fisheries, game and other natural resources, the best development and utilization of which are matters of scientific knowledge and which are in considerable degree now the subject of controversy by special interests, rather than the objects of care by intelligent agencies interested in their widest service and perpetuation.

Unless it is possible to have a careful discussion of these questions and to give certain fairly definite instructions, it would seem necessary in order to make any progress within the next year that the committee, or a new committee formed for the purpose, be given considerable discretion in the matter of character and extent of the legislation sought. While there is perhaps less hope at present on account of the urgency of other matters, it would seem that the importance of these measures for the Academy merit as prompt action as possible and it will be well certainly to have our needs formulated in such definite shape that we may be prepared to act as promptly as circumstances will permit.

T. C. MENDENHALL, *Chairman*,
HERBERT OSBORN.

Owing to the request of Dr. Mendenhall to be excused from the chairmanship of the committee and to Prof. Waite's temporary absence on war work, it was voted that the present

committee be discharged and that a new committee of five be appointed. The President appointed the following: Herbert Osborn, Chairman; T. C. Mendenhall, M. M. Metcalf, E. L. Rice, L. B. Walton.

Report of the Committee on Codification of the Constitution

The following report of the Committee on Codification of the Constitution, presented by Prof. Blake, was discussed at some length in both business sessions and finally laid upon the table by vote of the Academy.

May 30, 1918.

To the Ohio Academy of Science:

Two matters were referred to this committee—the codification of the Constitution and By-Laws and the question of lengthening the term of office of the President and Secretary. The term of office of the Treasurer was not specifically mentioned, but should be logically included with the others.

One member of the committee, Professor Carney, has been out of the State so much of the time that he has been practically unavailable; the remaining members, neither of whom was able to attend the last annual meeting, are somewhat in doubt concerning the intention of the Academy as to “codification,” and are in decided disagreement concerning the question of the term of office.

Interpreting “codification” in the narrow sense, and not as the equivalent of general revision, the committee begs to report that the Secretary has a record of all amendments which have been passed, and that the preparation of the Constitution and By-Laws for the press will be a simple clerical matter when the Executive Committee is ready to proceed with the printing.

Considering the term of office of President, Secretary and Treasurer, the committee, while unable to present a definite recommendation, offers the following suggestions:

1. *Term of Office of President.*—One member of the committee favors the lengthening of the term to three years, for the following reasons: The Ohio Academy bears the same relation to the State Government that the National Academy of Science does to the Federal Government. For the period of the war and especially for the reconstruction period after the war it would seem that longer terms of office than at present would give the opportunity for some real constructive work of immense and permanent value. The other member feels that it is wiser to retain the present one year term, particularly in view of the fact that the President is expected to present the annual address. The change to the longer term would necessitate the preparation of three consecutive addresses by the same man would leave the Academy without a presidential address in two out of every three years. A third alternative would be the abolition of the address—a result equally objectionable with the others.

2. *Term of Office of Secretary.*—It is agreed by the committee that the office of the secretary should be somewhat permanent; and one member of the committee would secure this result through lengthening the term to five years. In favor of this view, he further suggests that the office of secretary should be the most permanent of any of the offices. If the presidency had a three year period and the secretaryship a five year period, it would seldom occur that both incumbents would complete their terms simultaneously. The important thing of the whole matter is continuity of constructive policy. The other member of the committee, (owing to the constitution of the committee, it is fair to Professor Blake to add that this member is the present secretary), believes that the desired permanency can be secured by indefinite re-election, while the Academy may more easily and more speedily eliminate an undesirable official.

3. *Term of Office of Treasurer.*—The arguments pro and con are essentially as in the case of the secretaryship.

Respectfully submitted,

EDWARD L. RICE,
FREDERICK C. BLAKE,
Committee.

Election of Officers

From the double slate of nominations prepared by the Nominating Committee, the following officers for 1918-19 were elected by the ballot of the Academy.

President—Professor M. M. METCALF, Oberlin College, Oberlin.

Vice-President for Zoology—Professor R. A. BUDINGTON, Oberlin College, Oberlin.

Vice-President for Botany—Professor C. E. O'NEAL, Ohio Wesleyan University, Delaware.

Vice-President for Geology—Professor G. F. LAMB, Mt. Union College, Alliance.

Vice-President for Physics—Professor SAMUEL R. WILLIAMS, Oberlin College, Oberlin. (On resignation of Prof. Williams, owing to absence from the State on leave, the Executive Committee appointed Professor S. J. M. ALLEN, University of Cincinnati, to fill vacancy).

Vice-President for Medical Sciences—Professor ERNEST SCOTT, Ohio State University, Columbus.

Secretary—Professor E. L. RICE, Ohio Wesleyan University, Delaware.

Treasurer—Professor J. S. HINE, Ohio State University, Columbus.

Elective Members of Executive Committee—Professor R. C. OSBURN, Ohio State University, Columbus; Professor L. B. WALTON, Kenyon College, Gambier.

Member of Publication Committee—Professor L. G. WESTGATE, Ohio Wesleyan University, Delaware.

Trustees of Research Fund—(For three years). Dr. T. C. MENDENHALL, Ravenna; (For one year, to fill vacancy) Professor M. E. STICKNEY, Denison University, Granville.

Member of Library Committee—Professor W. C. MILLS, Ohio State University, Columbus.

Also, on nomination by the Nominating Committee, the following were elected to represent the Academy on the editorial board of the *Ohio Journal of Science*:

Zoology—Professor R. A. BUDINGTON, Oberlin College, Oberlin.

Botany—Professor M. E. STICKNEY, Denison University, Granville.

Geology—Professor G. D. HUBBARD, Oberlin College, Oberlin.

Physics—Professor S. J. M. ALLEN, University of Cincinnati, Cincinnati.

Anatomy, Physiology, etc.—Professor W. F. MERCER, Ohio University, Athens.

Election of Members

The Membership Committee reported ten names for election to membership; one additional name, previously approved by the Executive Committee and marked with * in the following list, was presented for ratification. All were elected as follows.

Basinger, Almon J., Entomology, Zoology, Botany, Columbiana.

*Gullum, Frank B., Chemistry, Physics, 237 E. Northwood Ave., Columbus.

Herrick, Francis H., Animal Behavior, Life and Instincts of Birds, Western Reserve University, Cleveland.

Lowry, Phil R., Entomology and Zoology, 1597 Hunter Ave., Columbus.

Mitchell, Roger I., Entomology, Sta. E, Route 6, Columbus.

Parks, F. H., Entomology, Botany and Zoology Bldg., Ohio State University, Columbus.

Sampson, Homer C., Botany, Ohio State University, Columbus.

Spohr, Carl F., Medical Dept., Ohio State University, Columbus.

Tucker, W. M., Geology, Dept. of Geology, Ohio State University, Columbus.

Waller, A. E., Botany, Agronomy, Dept. of Botany, Ohio State University, Columbus.

Wickliff, E. L., Zoology, Ornithology, Columbus.

The Report of the Committee on Necrology

The following report was presented by the Committee on Necrology.

ADOLPH FEIEL.

Born in Wurtemberg in June, 1836; died in Columbus, February 22, 1917.

He received a common school education at home and came to the United States when eighteen years old. From 1876 to 1879 he was a student in Starling Medical College, completing the regular course in medicine—then three years—but refused to apply for a degree, stating in his modest way that he did not feel himself worthy of the honor.

He was appointed assistant and later given charge of the course in Histology in Starling Medical College. In 1895 he came to the Ohio State University as instructor in Histology, which position he held until shortly before his death.

He was remarkably proficient in histological technique. His interpretation of a microscopic preparation was exceeded by no one I ever knew. His study and knowledge of the protozoa was extensive.

His induction into science was interesting. A guest at a hotel where Mr. Feiel was then employed left behind a popular book on science. In it was an illustrated description of the human skin. With characteristic conservatism, our friend doubted that so much detail was present in such an apparently simple object. His savings went toward the purchase of a microscope, and then came a realization of the difficulties that beset the investigator. He entered Starling College mainly for the purpose of obtaining section of the human skin and while this was the beginning his scientific spirit led him on and on in the pursuit of knowledge in his chosen field.

He was a man of sterling integrity and of honest ideals. He was joint author of two papers published in the transactions of the American Microscopical Society dealing with "The Trophic Effects upon the Heart after Section of the Vagi."

A. M. BLEILE.

Resolutions

The following resolutions were presented by the Committee on Resolutions and adopted by the Academy.

1. The Academy wishes to express its grateful appreciation of the hospitality of the Ohio State University in connection with its meeting.

2. The Academy wishes again to express to Mr. Emerson McMillin its sense of the great service he is rendering in his generous gifts to the Research Fund, and its gratitude to him for his support of this, the vital part of our work.

M. M. METCALF, *Com.*

The following additional resolution was adopted by the Academy on motion of Professor Walton.

The Ohio Academy of Science places itself on record as deprecating the suppression of the study of the German language in the curricula of some of our colleges.

The study of German should be continued not only by reason of its direct utility to our troops abroad, but also because it is fundamentally necessary to science and productive scholarship.

It is not the language, but Prussian ideas, which are antagonistic to the Allied nations; and any action which prevents the efficient development of scholarship and science, and of the industries dependent upon them, will prove advantageous to our enemies.

Proposed Restriction of Membership of Academy

A proposition was presented to the Academy by Dr. T. C. Mendenhall, looking to a restriction of membership to those engaged in professional and productive scientific work. Thus membership might be "made of greater importance by being made more difficult," and the Ohio Academy might realize more fully the "influence throughout the State that such a body should have." The Academy voted a general approval of the suggestion, together with its reference to a committee to be appointed by the President. This action and the report of the committee (to be included in the preliminary announcement of the next Annual Meeting) are to be interpreted as notice of a proposed amendment of the Constitution. The matter was referred by the President to the Executive Committee.

Miscellaneous Business

Voted that the Treasurer be authorized to pay the bill for binding a file of the Annual Reports, prepared by the Library Committee for the use of the Secretary.

Voted that the Secretary be authorized to draw upon the Treasurer for the payment of clerical assistance, not to exceed fifty dollars per year.

Adjournment

The meeting adjourned without determining the place of the next meeting.

SCIENTIFIC SESSIONS

The complete scientific program of the meeting follows:

Presidential Address

"The Origin of the Cerebral Ganglia of the Vertebrates,"

F. L. LANDACRE

Symposium on Science and the War

The Work of the Ground Schools in the Training of the Air Forces of the United States.....	F. C. BLAKE
Modern Methods of Plant Disease Control.....	W. G. STOVER
Psychological Tests in the Army.....	GEORGE F. ARPS
Methods of Teaching the Theory of Flight in Schools of Aeronautics.....	H. C. LORD
Topography and the War on the Western Front.....	T. M. HILLS
The Newer Demands on Physics and Physics Teachers Due to the War....	E. H. JOHNSON

Papers

1. Notes on Distribution of North Atlantic Bryozoa. 10 min. (Lantern),
RAYMOND C. OSBURN
2. The Economic Value of the Ephemerida. 5 min.....CHAS. P. FOX
3. A Peculiar Habit of the Rusty Grackle. 3 min.....EDWARD L. RICE
4. Remarks on Leaf Hoppers on Hawaiian Islands. 8 min....HERBERT OSBORN
5. The Fauna of a Series of Rock-bottomed Ponds. 15 min. (Lantern),
F. H. KRECKER
6. The Habits of the Folding-door Spiders. 20 min.....W. M. BARROWS
7. The Subterranean Life of Meadows and Pastures. 10 min. HERBERT OSBORN
8. Opalina and the Origin of the Ciliata. 25 min.....MAYNARD M. METCALF
9. The Bryozoan Gizzard. 3 min.....RAYMOND C. OSBURN
10. Free-swimming Larval Colonies of Pectinatella from Black Channel,
Cedar Point. 8 min.....STEPHEN R. WILLIAMS
11. Anatomy of Echinorhynchus sp. 8 min.
C. F. MCKHANN, JR., introduced by STEPHEN R. WILLIAMS
12. The Effect of Certain Ductless Gland Extracts on Plant Tissues. 10 min.
(Lantern).....R. A. BUDINGTON
13. Our Knowledge of Ohio Crustacea. 5 min.....RAYMOND C. OSBURN
14. A List of Ohio Spiders (now in press). 5 min.....W. M. BARROWS
15. A Preliminary Survey of the Protozoa of Mirror Lake on the Ohio State
University Campus. 6 min.....MABEL E. STEHLE
16. Application of Colloid Chemistry to Nephritis. 15 min. HAZEL C. CAMERON
17. Reaction Time in the Blind and the Deaf. 5 min.....A. M. BLEILE
18. The Effect of Radium Radiations on the Germ Cells of Drosophila
ampelophila. 20 min.....W. M. BARROWS
19. Studies of Vaso-motor Balance. 15 min.
CLYDE BROOKS, CLAYTON MCPEEK and R. J. SEYMOUR
20. Note on the Catalase Content of the Turtle Heart. 4 min....R. J. SEYMOUR
21. Pneumococcus Types. 5 min.....CARL L. SPOHR
22. The Cancer Problem. 20 min. (Lantern).....ERNEST SCOTT
23. Behavior of the X-chromosomes in Branchipus vernalis. 5 min.
R. C. BAKER
24. Work of the Plant Disease Survey, U. S. D. A. in Ohio. 10 min....A. D. SELBY
25. The Lecideaecæ of Ohio. 15 min. (Lantern).....BRUCE FINK
26. Interesting Ascomycetes. 10 min. (Lantern).....BRUCE FINK
27. A Revised Course for Secondary Botany. 15 min.....BLANCHE McAVOY
28. Succession on Prairies. 20 min. (Lantern).....HOMER C. SAMPSON

29. Regeneration Studies of Bryophyllum. 20 min. (Lantern).
CHARLES W. MCINTYRE
30. An Electric Drying Oven for Plant Presses. 5 min. E. LUCY BRAUN
31. Inland Associations of Algæ. 20 min. (Lantern)..... EDGAR N. TRANSEAU
32. The Effect of Hairy Coverings on Transpiration. 10 min. (Lantern).
JASPER D. SAYRE
33. The Indicator Significance of Plant Associations in Crop Distribution
in the United States. 25 min. (Lantern)..... ADOLPH WALLER
34. Vegetative Reproduction of the Pinnatifid Spleenwort. 5 min. (Lantern).
CLARA G. MARK
35. Effect of Seed Treatment for Smut on Germination. 10 min.
WILMER G. STOVER
36. An Apple Root Fungous Disease. 10 min. HARRY W. LUTZ
37. Characteristics of the Eruption of Katmai as Indicated by its Effect
on Vegetation. 15 min. (Lantern)..... ROBERT F. GRIGGS
38. Some Land Forms of Central Southern Ohio. 10 min. LEWIS G. WESTGATE
39. Fossils of the Greenfield (Ohio) Dolomite and Where to Find Them.
15 min. C. W. NAPPER
40. Moulding Sands of Ohio. 10 min. J. A. BOWNOCKER
41. Effects of the Wisconsin Glacier on a Portion of the Whitewater Valley
in Indiana. 15 min. W. M. TUCKER
42. Some Especially Interesting New Species of Richmond Fossils. 8 min.
(Lantern)..... W. H. SHIDELER
43. Effect of Transverse Magnetic Field on Some of the Physical Properties
of Nickel Wire. 10 min. A. A. ATKINSON
44. Title to be announced. T. C. MENDENHALL
45. The Magnetic-Mechanical Analysis of Cast Iron. 10 min.
SAMUEL R. WILLIAMS

Demonstrations

1. Specimens and Photographs from the Valley of Ten Thousand Smokes.
ROBERT F. GRIGGS
2. Specimen of a Dermoid Cyst with Teeth, loaned by Dr. H. Moore,
Oxford. STEPHEN R. WILLIAMS
3. Leaf Hoppers of Hawaiian Islands. HERBERT OSBORN
4. One-eyed Frog (*Acris gryllus*). F. H. KRECKER
5. Laboratory Table Tray. F. H. KRECKER and W. J. KOSTIR
6. Colony Forms in Marine Bryozoa. RAYMOND C. OSBURN
7. Exhibit of Greenfield (Ohio) Dolomite Fossils. C. W. NAPPER
8. Two New Varieties of *Acer rubrum*. FRED A. DETMERS
9. A Collection of Ohio Spiders; a Method of Exhibiting Spiders; Nest of
Folding-door Spider. W. M. BARROWS
10. A Vaso-motor Balance. CLYDE BROOKS, CLAYTON McPEEK, R. J. SEYMOUR
11. Models of Embryonic Skull of *Eumeces*. EDWARD L. RICE
12. Sections of Nasal Capsule and Olfactory Nerves of Embryonic *Eumeces*.
EDWARD L. RICE
13. X-chromosomes of *Branchipus vernalis*. R. C. BAKER
14. Origin of Cartilage from Ectoderm in the Urodeles. F. L. LANDACRE

EDWARD L. RICE, *Secretary*.

PROCEEDINGS
OF THE
OHIO
ACADEMY OF SCIENCE

VOLUME VII, PART FOUR

Annual Report
Twenty-ninth Meeting

ANNUAL REPORT

OF THE

OHIO ACADEMY OF SCIENCE

Twenty-ninth Meeting

1919

Organized 1891

Incorporated 1892

PUBLICATION COMMITTEE

J. H. SCHAFFNER

L. B. WALTON

L. G. WESTGATE

Date of Publication, January 7, 1920

Published by the Academy
Columbus, Ohio

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1892.	Columbus	1906.	Columbus
1893.	Columbus	1907.	Oxford
1894.	Columbus	1908.	Granville
1895.	Cincinnati	1909.	Delaware
1896.	Columbus	1910.	Akron
1897.	Columbus	1911.	Columbus
1898.	Columbus	1912.	Columbus
1899.	Cleveland	1913.	Oberlin
1900.	Columbus	1914.	Columbus
1901.	Columbus	1915.	Columbus
1902.	Columbus	1916.	Columbus
1903.	Granville	1917.	Columbus
1904.	Cleveland	1918.	Columbus
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'03. WILLIAMS, STEPHEN R., *Biology*.....300 E. Church St., Oxford

- '97. WILLIAMSON, E. B., *Entomology*.....Bluffton, Ind.
 '08. WILSON, STELLA S., *Geography, Geology*.....Station B, Route 7, Columbus
 '14. WILTBERGER, P. B., *Entomology, Zoology*.....Columbus
 '15. WITHROW, JAMES R., *Chemistry, Mineralogy*.....O. S. U., Columbus
 '19. WOOD, LOUISE, *Psychology*.....Bureau of Juvenile Research, Columbus
 '92. WRIGHT, G. FREDERICK, *Geology*.....Oberlin
 '19. WRIGHT, IVAN G., *Psychology*.....Lenox Hotel, Columbus
 '15. WYKOFF, HARRY S., *Biology, Botany*.....2234 Shunk Ave., Alliance
 '17. YAMPOLSKY, CECIL, *Botany, Zoology, Genetics*.....Toledo Univ., Toledo
 '03. YORK, HARLAN H., *Botany*.....Brown Univ., Providence, R. I.
 '15. YOST, RALPH, *Genetics, Botany, Bacteriology*.....Box 81, Thornville
 '06. YOUNG, R. A., *Botany*.....120 Chestnut Ave., Takoma Park, D. C.

Total Membership—284.

PROCEEDINGS
of the
TWENTY-NINTH ANNUAL MEETING
of the
OHIO ACADEMY OF SCIENCE
COLUMBUS,
May 29th, 30th and 31st, 1919.

The Twenty-ninth Annual Meeting of the Ohio Academy of Science was held at Ohio State University, Columbus, Ohio, May 29 to 31, 1919, under the presidency of Professor Maynard M. Metcalf. Seventy-nine members were registered as in attendance; forty new members were elected.

On invitation of the Academy, a meeting of the psychologists of the State was held in connection with the Academy meeting, for the presentation of papers and the consideration of the formation of a Section for Psychology in the Academy. The organization of the section was accomplished, and the titles of papers presented are included in the program of the meeting of the Academy.

At the close of the formal session, the geologists, under the leadership of Professors J. E. Hyde and T. M. Hills, made an excursion to Newark for the study of glacial physiography and the Upper Waverly formation, while Professor W. M. Barrows conducted a zoological and botanical excursion to Sugar Grove

GENERAL PROGRAM

THURSDAY, MAY 29.

- 2:00 P. M. Business Meeting.
 3:30 P. M. Reading of Papers, General Session.
 6:00 P. M. Dinner, followed by Address of the President, Professor Maynard M. Metcalf, Oberlin College, "The Scientific Spirit."
 8:30 P. M. Informal Social Gathering.

FRIDAY, MAY 30.

- 9:00 A. M. Reading of Papers, Sectional Session.
 12:30 P. M. Luncheon.
 2:00 P. M. Adjourned Business Meeting.
 3:00 P. M. Reading of Papers, General Session.
 4:30 P. M. Demonstrations.
 6:00 P. M. Supper.
 7:30 P. M. Public Lecture by Mr. David Carroll Churchill, Oberlin, "Airplanes, Present and Future."
 8:30 P. M. Informal Social Gathering and Inspection of Demonstrations.

SATURDAY, MAY 31.

Excursions.

MINUTES OF BUSINESS MEETINGS

The first business session was called to order by President Metcalf at 2:00 P. M., on Thursday, May 29. An adjourned session was held at 2:00 P. M. on the following day.

The appointment of the following committees for the meeting was announced by the chair:

Committee on Membership—F. C. Blake, G. D. Hubbard, L. B. Walton.

Committee on Resolutions—T. C. Mendenhall, C. G. Shatzer, E. L. Fullmer.

Committee on Necrology—C. E. O'Neal, E. L. Rice.

The following Auditing Committee was elected by the Academy: J. H. Schaffner, R. C. Osburn.

The following Nominating Committee was elected by the ballot of the Academy: F. L. Landacre, G. F. Lamb, T. C. Mendenhall.

Report of the Secretary

The following report by the Secretary was received and ordered filed:

DELAWARE, OHIO, May 26, 1919.

To the Ohio Academy of Science:

In addition to the work done in conjunction with the Executive Committee (covered in the report of that Committee) and with the Program Committee, the Secretary has conducted the usual routine work of his office.

A brief report of the Twenty-eighth Annual Meeting was prepared for "Science," and appeared in the number for September 13. The complete report has appeared in the April number of the Ohio Journal of Science and in the Proceedings of the Academy. Announcement of the current meeting was sent to the Ohio State Journal, Columbus Dispatch, and Columbus Citizen.

In connection with the filling out of a questionnaire from another Academy, it became necessary for the Secretary to compile data as to the distribution of our membership in the various sciences. The figures, although only an approximation, are not without significance and may be of interest to the Academy. Probably some members who are classed under Zoology and Botany belong rather in the group of Medical Sciences, not having revised their classification since the foundation of the section of Medical Sciences. The figures are as follows:

Zoology, 79; Botany, 66; Geology, 40; Physics, 29; Medical Sciences, 16; Chemistry, 6; Mathematics, 4; Unclassified, 18.

The Secretary has commenced to collect data for a permanent record of the war activities of the Academy membership. The returns are too incomplete to justify a report at this time. If the undertaking is approved, it is desirable that a special committee be appointed for its completion and that the Academy authorize the publication of the completed roll.

Two years ago the Academy authorized the reprinting of the Constitution and By-Laws and appointed a committee for this purpose. Owing to an unusual number of pending amendments the committee took no action. Does the Academy wish a reprinting in connection with the report of this meeting? Or is it desirable to wait until 1920 (Thirtieth Annual Meeting) and then reprint regularly at five year periods? The last printing of the Constitution was in 1913; about a dozen amendments have been enacted since that date.

The circular of information is now out of print. Does the Academy desire to have it revised and reprinted? If so, are there any suggestions as to changes in form or content?

Respectfully submitted,

EDWARD L. RICE, *Secretary.*

Report of the Treasurer for the Year 1918-19

The report of the Treasurer was received as follows, and referred to the Auditing Committee, whose report is appended.

For the year since our last annual meeting, the receipts, including balance from last year, have amounted to \$481.85, and the expenditures to \$357.70, leaving a cash balance of \$124.15.

RECEIPTS.

Balance from last year	\$201.35
Membership dues	280.50

\$481.85

EXPENSES.

Miscellaneous expenses	\$ 69.70
190 subscriptions to the Ohio Journal of Science	190.00
Publication of Annual Reports for 1916-17	98.00
Balance, May 30, 1919	124.15

\$481.85

Respectfully submitted,

JAMES. S. HINE, *Treasurer.*

October 15, 1919.

These accounts have been audited and found correct.

RAYMOND C. OSBURN,
JOHN H. SCHAFFNER,
Auditing Committee.

Report of the Executive Committee

The report of the Executive Committee was received as follows and ordered filed.

May 29, 1919.

To the Ohio Academy of Science:

A meeting of the Executive Committee was held in Columbus, December 7, 1918, with all members in attendance. A second meeting was held this morning, with the following members present: Metcalf, Osburn, Walton and Rice. Aside from these meetings a considerable amount of business has been transacted through correspondence.

After careful consideration of the proposal to restrict the membership of the Academy to those engaged in productive scientific work, presented by Dr. Mendenhall at the last Annual Meeting and referred to the Executive Committee, the Committee makes the following recommendations: (1) That a class, to be known as Fellows, be created from the members who are doing productive scientific work; (2) that

the selection of Fellows be made by the Executive Committee and the Vice-Presidents of the various sections; (3) that eligibility to office be limited to Fellows. It is hoped in this way to secure the objects of Dr. Mendenhall's proposition without sacrificing the present popular and democratic character of the Academy. A straw vote of members not expecting to attend the present meeting shows 27 in favor of the change, 1 against it and 14 neutral or in doubt. The substance of these recommendations will be presented in the form of amendments of the Constitution for action later in the meeting.

An invitation to hold the Annual Meeting for 1919 in London was received last year from Mrs. Katharine Dooris Sharp, seconded by the local Board of Trade. After a somewhat extended correspondence it was decided that it would be difficult, if not impossible, to secure the needful hotel and meeting accommodations in London, and the matter was dropped by mutual consent.

Correspondence was also conducted through the Secretary relative to the possibility of a joint meeting with the Indiana Academy; but this project was given up, at least for the present year, largely because of the fact that the spring meeting of the Indiana Academy is wholly a field meeting. It seemed unwise to omit the only opportunity of the year for the reading of papers in the Ohio Academy. As noted in the preliminary announcement of this meeting, the Indiana Academy extended a very cordial invitation to the members of the Ohio Academy to join them in their field meeting of last week.

The ultimate decision concerning time and place of the meeting is already known to the Academy.

The Executive Committee directed the Secretary to renew correspondence with the psychologists of the state with a view to the establishment of a Section of Psychology. A partial result of this correspondence is seen in the psychological titles listed in the program of the meeting; it is hoped that a further result will be seen tomorrow morning in the organization of the Section of Psychology.

The resignation of Prof. Samuel R. Williams from the Vice-Presidency for Physics, because of sabbatical leave and prospective absence from the state, was presented to the Executive Committee, and Prof. S. J. M. Allen was appointed to fill the vacancy.

Twelve members have been elected by the Executive Committee since the last annual meeting. The names will be presented later for ratification by the Academy.

The Executive Committee unites in recommending two changes in the financial plan of the Academy—the amendment of the By-Laws to increase the annual dues from \$1.50 to \$2.00, and the authorization by the Academy of the payment of traveling expenses of officers and committee members attending regularly authorized committee meetings not held in connection with the Annual Meeting of the Academy.

The Committee also unites in recommending the rescinding of the By-Law requiring the Nominating Committee to present a double slate of nominations for officers.

At the meeting held this morning the President of the Academy presented correspondence with Professor J. McKean Cattell relative to an affiliation of the Ohio Academy with the American Association for the Advancement of Science, the affiliation to permit the representation of the Academy on the Council and Sectional Committees of the American Association for the Advancement of Science, but to commit the Academy to no financial obligations. The Executive Committee recommends that the Academy approve the general plan of affiliation and refer the matter with power to the Executive Committee for 1919-20.

Respectfully submitted,

EDWARD L. RICE,
Secretary, for the Committee.

Report of the Publication Committee

The following report of the Publication Committee was received and ordered filed.

May 29, 1919.

The Chairman of the Publication Committee reports the publication of the "Proceedings" mailed to members of the Academy several weeks prior to the date of the present meeting.

L. B. WALTON.

Report of the Trustees of the Emerson McMillin Research Fund

The following report of the Trustees of the Research Fund was received and ordered filed. The financial portion of the report was referred to the Auditing Committee, whose report is appended.

The Trustees of the McMillin Research Fund submit the following report for the year ending May 30, 1919.

RECEIPTS.

Balance on hand May 30, 1918, as per last report	\$913.52
May 23, 1919, Received from Mr. McMillin	250.00
	\$1,163.52

EXPENDITURES.

June 3, 1918, Liberty Bond, par value \$500.00 (held for safe keeping by the Capital City Bank, Columbus, Ohio)	484.95
Cash balance in bank, May 30, 1919	678.57
Total assets (Liberty Bond at par)	1,178.57

GRANTS DURING THE YEAR.

May 31, 1918, Professor J. S. Hine	\$ 50.00
February 3, 1919, Professor Walter H. Bucher	100.00
	\$ 150.00
Liabilities from previous grants	137.60
Total liabilities	287.60
Cash in bank in excess of liabilities	390.97

The Trustees announce that grants concerning which no reports of progress have been received will be cancelled at the end of the year.

Regarding the grant of \$100.00 to Professor Bucher, it may be desirable to explain that it was made for the purpose of relabelling a valuable and extensive collection of Naiades made by the late George W. Harper, of Cincinnati, and by him donated to the University of Cincinnati. All had been carefully labelled as to locality, but the labels were old, faded and many of them loose, so that there was great danger of their being hopelessly disarranged and permanently lost.

The grant of a portion of the research fund to secure the preservation of the collection is something of a departure from the usual practice, but the object to be attained seemed to justify it. It was agreed on the part of the Cincinnati authorities that the collection should forever be available for study by any member of the Academy whose qualifications for such work were properly attested by its officers.

T. C. MENDENHALL, *Chairman*,
HERBERT OSBORN.

May 30, 1919.

The financial portion of the report of the Trustees of the Research Fund has been audited and found correct.

RAYMOND C. OSBURN,
JOHN H. SCHAFFNER,
Auditing Committee.

Report of the Library Committee

For the Library Committee, Mr. Reeder, of the Ohio State University Library, presented the following report, which was received and ordered filed.

May 29, 1919.

To the Ohio Academy of Science:

The Library Committee begs leave to submit the following report:

(1) The sales of publications during the year amounted to \$13.90. This sum has been turned over to the Treasurer.

(2) Printed copies of the Annual Report of the Twenty-eighth Meeting, 1918, were received about two weeks ago, and copies have been mailed to all persons on the membership list as printed in that report, and to all institutions, societies and libraries on the exchange list.

(3) War conditions affected the exchange situation of the Academy as it did of all scientific organizations. Fewer publications were issued and transportation difficulties hindered their distribution. However, since the resumption of near-peace conditions, the foreign societies are informing us that they are now ready to resume exchange relations. Institutions in this country are active in completing files and more parts of the Academy's Proceedings have been sent out for this purpose than usual. Several of these libraries have been restored to the exchange mailing list.

(4) The status of the Union Catalog of Scientific Periodicals is about the same as outlined in the last report. Additional shipments of cards have been received from Oberlin College Library and the Western Reserve University College for Women. On account of the difficulties experienced by libraries in maintaining and meeting the extra demands for service during the war, no pressure has been brought to bear for additional contributions to the Union Catalog. However, it is known that several libraries have partially completed records ready for shipment, and are only waiting the completion of their periodical listing before depositing the cards with the Academy.

(5) The University Library desires to call attention again to its desire and willingness to serve the members of the Ohio Academy with scientific literature. Through the exchanges and regular purchases, there is maintained a library equipment which can serve in a very satisfactory way the scientists of this state, if they only will make use of the facilities offered to them, either directly through study in the library itself, or through the system of inter-library loan.

Respectfully submitted,

C. W. REEDER.

Report of the Committee on Legislation

The following report of the Committee on Legislation was received and ordered filed.

Your committee appointed to consider the matter of Legislation begs to report as follows:

We find that a number of State Academies receive state support either in the form of publication funds, or support of secretaries or other activities. In all states where such support is in force there seems to be agreement as to the advantage of such support and the only argument opposed to the plan is the possible interference with the entirely independent attitude of the academies as to matters affecting state activity.

The committee recommends that legislation to provide the following lines of support be requested at the hands of the next session of the general assembly and that the Committee on Legislation be authorized to arrange for the introduction of the necessary bills and to meet any necessary expenses incurred in the proper attention to their consideration.

First—A provision for the publication of the Proceedings of the Academy, preferably by the direct appropriation of an adequate sum for a creditable publication of not more than 500 pages per year, or, if necessary, as a part of the State printing.

Second—A provision for the compensation of a permanent secretary whose duty shall be to edit the proceedings, look after the activities of the society, the arrangement of details for scientific service to the State under the plan proposed in No. 3, and other matters of society interest.

Third—A provision that in consideration of the support provided as above, the academy agree to act in an advisory capacity in all matters of scientific concern in which the officers of the state may desire their services, such relation to be arranged through the officers and such committees as they or the Executive Committee may appoint, such services to include advice in matters of policy concerning state service of a scientific character and the recommendation of a special expert scientific assistance where needed.

HERBERT OSBORN,
MAYNARD M. METCALF,
EDWARD L. RICE,
T. C. MENDENHALL,
L. B. WALTON.

Election of Officers

The following officers and committee members for 1919-20 were elected by the ballot of the Academy:

President—Professor F. C. BLAKE, Ohio State University, Columbus.

Vice-Presidents:

Zoology—Professor F. H. HERRICK, Western Reserve University, Cleveland.

Botany—Professor A. B. PLOWMAN, Municipal University of Akron, Akron.

Geology—Professor J. E. HYDE, Western Reserve University, Cleveland.

Physics—Professor M. E. GRABER, Heidelberg University, Tiffin.

(Owing to removal from the state, Professor Graber was unable to accept his election and the Executive Committee appointed Professor J. A. CULLER, Miami University, Oxford to fill the vacancy).

Medical Sciences—Professor R. J. SEYMOUR, Ohio State University, Columbus.

Psychology—Professor G. R. WELLS, Ohio Wesleyan University, Delaware.

Secretary—Professor E. L. RICE, Ohio Wesleyan University, Delaware.

Treasurer—Professor W. J. KOSTIR, Ohio State University, Columbus.

Elective Members of Executive Committee—Professor WILLIAM MCPHERSON, Ohio State University, Columbus; Professor L. G. WESTGATE, Ohio Wesleyan University, Delaware.

Member of Publication Committee—Professor J. H. SCHAFFNER, Ohio State University, Columbus.

Trustee of Research Fund—Professor G. D. HUBBARD, Oberlin College, Oberlin.

Member of Library Committee—Mr. C. W. REEDER, Ohio State University, Columbus.

Representatives on Editorial Board of Ohio Journal of Science:

Zoology—Professor R. A. BUDINGTON, Oberlin College, Oberlin.

Botany—Professor BRUCE FINK, Miami University, Oxford.

Geology—Professor G. D. HUBBARD, Oberlin College, Oberlin.

Physics—Professor S. J. M. ALLEN, University of Cincinnati, Cincinnati.

Medical Sciences—Professor F. C. WAITE, Western Reserve University, Cleveland.

Psychology—Professor H. A. AIKINS, Western Reserve University, Cleveland.

Election of Members

The Membership Committee reported twenty-eight names for election to membership; twelve additional names, previously approved by the Executive Committee and marked with * in the following list, were presented for ratification. All were elected as follows:

Aikins, H. Austin, Psychology, Western Reserve University, Cleveland.

Alexander, William H., Meteorology, Weather Bureau, Columbus.

*Ballin, E., Chemistry, 320 Burns Ave., Wyoming.

*Birch, T. Bruce, Psychology, 1115 N. Fountain Ave., Springfield.

*Bliss, Chester I., Entomology, Psychology, General Biology, Museum Technique, 316 W. Eighth Ave., Columbus.

*Breitenbecher, J. K., Zoology, Western Reserve University, Cleveland.

Bridges, James W., Psychology, Ohio State University, Columbus.

Campbell, Eva Galbraith, Biology, 141 N. Franklin Street, Delaware.

Churchill, D. C., Physics, Oberlin.

Courtright, Emma L., Biology, 1493 E. Long St., Columbus.

Coy, Genevieve L., Psychology, 317 W. Tenth Ave., Columbus.

Crane, Harry W., Psychology, 1827 Summit Street, Columbus.

Culler, Elmer A., Psychology, Ohio State University, Columbus.

Evans, J. E., Educational and Child Psychology, 31 Seventeenth Avenue, Columbus.

*Fox, Rolland D., Biology, 395 Doyle Street, Akron.

Gatewood, Esther L., Psychology, Biology, 440 E. North Broadway, Columbus.

Goudge, Mabel Ensworth, Psychology, 1827 Summit Street, Columbus.

Jones, C. Thompson, Psychology, Bureau of Juvenile Research, Columbus.

*Kindred, James Ernest, Zoology, 1353 E. Ninth Street, Cleveland.

Lampe, Lois, Botany, Washington C. H.

Mateer, Florence, Psychology, Bureau of Juvenile Research, Columbus.

Mitra, Swarna Kumer, Botany, 189 W. Eleventh Avenue, Columbus.

Morrey, C. B., Bacteriology, Ohio State University, Columbus.

Mosher, Edna, Entomology, Botany and Zoology Building, Ohio State University, Columbus.

- *Otis, Charles H., Botany, Adelbert College, Western Reserve University, Cleveland.
- Pintner, Rudolf, Psychology, Ohio State University, Columbus.
- Reamer, Jeannette, Psychology, 1751 Franklin Park, So., Columbus.
- Ridenour, Alice Louise, General Science, London.
- Rogers, A. Sophie, Psychology, Dept. of Psychology, Ohio State University, Columbus.
- *Shollenberger, F. J., Physics, Mount Union College, Alliance.
- *Skinner, Charles H., Physics, 102 University Avenue, Delaware.
- Taylor, Mrs. Bayard, Botany, Ornithology, West Jefferson.
- *Thomas, Edward S., Ornithology, 81 Ruggery Bldg., Columbus.
- Toops, Herbert A., Psychology, Harrisburg.
- *Trettien, A. W., Psychology, Toledo University, Toledo.
- *Wagner, M. Channing, Physics, 941 Harriett St., N. W., Canton.
- Weiss, Albert P., Psychology, Biology, Ohio State University, Columbus.
- Wells, G. R., Psychology, Delaware.
- Wood, Louise, Psychology, Bureau of Juvenile Research, Columbus.
- Wright, Ivan G., Psychology, Lenox Hotel, Columbus.

The Report of the Committee on Necrology

The following report was presented by the Committee on Necrology:

But a single death in the Academy membership has been reported this year.

EUGENE RAY BURTON joined the Academy in 1915. He was born in Hamilton, Iowa, May 10, 1891. When he was about five years old, his family moved to Findlay, Ohio, where he spent his boyhood and prepared for college. In the fall of 1911 he entered Ohio Wesleyan University, where he received the degrees of B. A. and M. S. in 1915 and 1916 respectively. Before his graduation he served as assistant in Zoology, and remained as teaching fellow, 1915-16, and instructor, 1916-17. In the latter year he and his wife (Dorothy Walters Burton, also a member of the Academy) were in joint charge of the zoological work of the college during the absence of the head of the department.

The year 1917-18 was spent in a successful experiment as superintendent of schools in Felicity, Ohio; but Mr. Burton felt that Biology was his real field, and resigned his position to accept an instructorship in Marquette University Medical School, Milwaukee, Wisconsin. This work he was destined never to take up. Early in the summer of 1918 he moved to Milwaukee, where he died suddenly on August 14, following an operation for appendicitis.

And thus, at its very beginning, a life was suddenly cut off which gave promise of the highest success and usefulness. Mr. Burton was devotedly interested in Zoology and absolutely loyal to scientific truth. Instinctive powers of observation and a passionate love of the out-of-doors gave him exceptional ability as a field naturalist. His death is a real scientific loss to the Academy; to those of us who were

intimately associated with him the personal loss is even more keenly felt. Mr. Burton was an original and stimulating student, a generous colleague, and a true friend, whom we can ill spare and never forget.

CLAUDE E. O'NEAL,
EDWARD L. RICE,
Committee.

Report of Committee on Resolutions

The following resolutions were presented by the Committee on Resolutions and adopted by the Academy:

1. The Academy wishes to thank the Local Committee and the professors and officers of Ohio State University for their aid in making the Twenty-ninth Annual Meeting a most successful one.

2. The Academy expresses its thanks to Mr. Emerson McMillin for his generous gifts in support of research work in Ohio.

3. The Academy thanks Mr. David Carroll Churchill for his interesting and instructive lecture on Airplanes.

4. The members of the Academy desire to express their appreciation of the work of our Secretary, which has so materially contributed to the success of this meeting.

T. C. MENDENHALL,
E. L. FULLMER,
Committee.

Amendment of Constitution

The following amendments of the Constitution, relative to the establishment of a class of Fellows, were unanimously adopted, notice having been given at the preceding Annual Meeting.

Article III, Section 1, amended to read:

The Academy shall be composed of Resident Members, Fellows, Corresponding Members, Honorary Members, and Patrons.

Article III, Section 2a, new section (to be renumbered when Constitution is reprinted), to read as follows:

Fellows shall be persons who are engaged in productive and scientific work.

Article III, Section 6, amended to read:

Only Resident Members, Fellows, and Patrons shall be entitled to vote in the Academy; only Fellows and Patrons shall be eligible to office and to membership in the Executive Committee.

Article V, Section 1, Paragraph (a¹), new paragraph (to be renumbered when Constitution is reprinted), to read as follows:

Fellows shall be elected by joint action of the Executive Committee and the Vice-Presidents; approval by three-fourths of the members of this joint committee shall be necessary to election.

Amendment of By-Laws

The following amendments of the By-Laws were adopted, changing the annual dues from one dollar and a half to two dollars, and rescinding the obligation upon the Nominating Committee to nominate two candidates for each office.

Chapter I, Section 1, amended to read:

No person shall be accepted as a Resident Member or as a Corresponding Member unless dues for the year are paid within three months after notification of election. The annual dues shall be two dollars, payable in advance. A single payment of twenty-five dollars, however, shall be accepted as commutation for life.

Chapter IV, Section 2, amended to read:

The Academy shall select by ballot a Nominating Committee, consisting of three members who shall nominate a candidate for each office, including elective members of the Executive Committee, the Publication Committee, and the Trustees of the Research Fund. Additional nominations may be made by any member of the Academy.

Committee on Legislation

The Committee on Legislation was continued, with power to add to its own membership if desired. The Committee was authorized to take such steps as may seem advisable, with the approval of the Executive Committee, to secure legislative support for the work of the Academy.

Section for Psychology

On request of the psychologists attending the meeting, the Academy authorized the formation of a Section for Psychology; and the Section was formally organized, with an initial membership of about twenty.

National Department of Public Works

An invitation was received from Mr. E. G. Bradbury, President of the Columbus Engineers' Club, to send a representative to the Annual Meeting of the Engineers' Club, Thursday evening, May 29, to report back to the Academy on the discussion of the proposed National Department of Public Works. The invitation was accepted; and Professor James R. Withrow was appointed to represent the Academy. At the adjourned business meeting on Friday, Professor Withrow presented the following resolution, which was adopted by the Academy:

Resolved, That the Ohio Academy of Science expresses its interest in any legitimate effort to render more effective the scientific and engineering work of the national government, and stands ready to approve and aid in any way within its power efforts at co-ordination of the public works of the national government which may be shown, to the Executive Committee of the Academy or to the Academy itself, to be an increase in scientific engineering effectiveness.

The Secretary was instructed to communicate the action to Mr. Bradbury, the Ohio representative of the national organizations which are backing this program.

Affiliation With A. A. A. S.

The general plan of affiliation, as reported by the Executive Committee, was approved by the Academy; and the incoming Executive Committee was authorized to proceed with the affiliation if found feasible.

Affiliation With Ohio Association of Technical Societies

The Executive Committee was instructed to investigate the desirability of an affiliation with the Ohio Association of Technical Societies, and to present a report at the next Annual Meeting.

War Roll

The President was instructed to appoint a committee of three to collect data concerning war activities of the membership of the Academy. The President appointed E. L. Rice, Chairman; J. S. Hine, W. J. Kostir.

Reprinting of Constitution, By-Laws and Circular of Information

The Secretary was instructed to have the revised Constitution and By-Laws reprinted in connection with the Report of the Thirtieth Annual Meeting, 1920, and regularly thereafter at five year intervals unless otherwise directed.

The Secretary was authorized to proceed at once with the revision and reprinting of the Circular of Information.

Expenses of Officers, etc.

The Treasurer was authorized to pay necessary expenses incurred by officers and committee members in attending regularly authorized committee meetings not held in connection with the Annual Meeting of the Academy.

The Treasurer was also authorized to pay the expenses of Mr. D. C. Churchill in connection with his lecture before the current Annual Meeting.

SCIENTIFIC SESSIONS

The complete scientific program of the meeting follows:

Presidential Address

"The Scientific Spirit".....M. M. METCALF

Public Lecture

"Airplanes, Present and Future" . . DAVID CARROLL CHURCHILL

Papers

1. The Theory of Chance Applied to the Bacon-Shakespeare Controversy.
30 min. (Lantern).....T. C. MENDENHALL
2. Teleology in the Teaching of Zoology. 15 min.....W. M. BARROWS
3. Dynamics and Evolution as illustrated in the Euglenoids. 15 min.
(Lantern).....L. B. WALTON
4. Notes on a Technique for the Study of Euglenidae. 5 min.....W. J. KOSTIR
5. The Comparative Resistance of Different Species of Euglenidae to
Acids. 5 min.....W. J. KOSTIR
6. Notes on a Tingid Destructive to Beans. 5 min.....HERBERT OSBORN
7. The European Corn Borer (*Pyrausta nubilalis* Hubn.) a Menace to
American Agriculture. 10 min.....E. C. COTTON
8. The Stratification of Spiders in Meadows. 15 min.....W. M. BARROWS
9. Concerning the Attachment of Larval Colonies of *Pectinatella* and
Plumatella. 10 min.....STEPHEN R. WILLIAMS
10. Remarks on the Phylum Prosopygia. 10 min.....RAYMOND C. OSBURN
11. The Bryozoan Fauna of Greenland. 5 min.....RAYMOND C. OSBURN
12. Classification of the Salpidae. 15 min. (Opaque projection),
MAYNARD M. MATCALF
13. The Remarkable Fauna of a Drop of Pond Water. 3 min.....W. J. KOSTIR
14. Polymorphism and Allelomorphism in *Bruchus quadrimaculatus*. 25 min.
J. K. BREITENBECHER
15. Circulation of Coelomic Fluid in a Nematode. 15 min.....F. H. KRECKER
16. Egg Laying of a Leech, *Piscicola*. 10 min.....F. H. KRECKER
17. The Columella Auris of the Reptiles. 10 min.....EDWARD L. RICE
18. Information wanted in Zoological and Botanical Cases to be Cited.
5 min.....KATHARINE D. SHARP
19. Use of Airplane in Studying Vegetation. 15 min. (Lantern).....PAUL B. SEARS
20. A Map of Ohio Prairies. 10 min.....P. B. SEARS
21. Brief Notes on Some Ohio Plants. 10 min.....L. S. HOPKINS
22. A Remarkable Bud Sport of *Pandanus*. 6 min.....JOHN H. SCHAFFNER
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42. Vaccines and Serums in Coccus Infections. 10 min. C. B. MORREY
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3. Exhibit of Ohio Cicadellidae..... HERBERT OSBORN
4. Indications of Circulation of Coelomic Fluid Shown by Preserved Nematodes..... F. H. KRECKER
5. Model of Nasal Region of the Lizard, Eumeces, ELVA PUMPHREY, introduced by EDWARD L. RICE
6. Sections of Columella Auris of the Lizard, Eumeces..... EDWARD L. RICE
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VOLUME VII, PART FIVE

Annual Report
Thirtieth Meeting

ANNUAL REPORT
OF THE
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Thirtieth Meeting

1920

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- '18. HERRICK, FRANCIS H. (F), *Animal Behavior, Life and Instincts of Birds*,
Western Reserve Univ., Cleveland
- '11. HILLS, T. M., (F), *Geology*.....Vassar College, Poughkeepsie, N. Y.
- '91. HINE, J. S. (F), *Entomology, Ornithology*.....O. S. U., Columbus
- '15. HOLT, W. P., *Geography, Geology, Zoology, Botany*.....
Normal College, Bowling Green
- '99. HOPKINS, LEWIS S. ('13), *Botany*.....Kent
- '12. HORMELL, W. G. (F), *Physics*.....Delaware
- '20. HOUSEHOLDER, F. F., *Physics*.....Municipal Univ. of Akron, Akron
- '06. HOUSER, J. S., *Entomology*.....Wooster
- '20. HOWARD, C. C., *Chemistry*.....Columbus
- '05. HUBBARD, G. D. (F), *Geology, Physiography*.....Oberlin
- '17. HUBER, H. E., *Biology*.....Ohio Northern Univ., Ada
- '20. HUBER, LAWRENCE L., *Zoology, Entomology*.....
Dept. of Zoology and Entomology, O. S. U., Columbus
- '12. HUMPHREY, LILLIAN E., *Botany*.....Ironton
- '05. HYDE, J. E. (F), *Geology*.....Adelbert College, Cleveland
- '13. IRWIN, OSCAR W. (F), *Physics*.....Toledo Univ., Toledo
- '01. JENNINGS, O. E. (F), *Botany*.....Carnegie Museum, Pittsburgh, Pa.
- '14. JOHNSON, E. H., *Physics*.....Gambier
- '94. JONES, LYNDS (F), *Ornithology*.....Spear Laboratory, Oberlin
- '20. KENNEDY, CLARENCE H., *Entomology*.....
Dept. of Zoology and Entomology, O. S. U., Columbus
- '19. KINDRED, JAMES ERNEST, *Zoology*.....1353 E. Ninth St., Cleveland
- '09. KING, J. LIONEL, *Botany, Entomology*.....
Dept. Agriculture, Bureau of Economic Zoology, Harrisburg, Pa.
- '17. KISLIUK, MAX, JR., *Zoology, Entomology, Botany*.....
134 S. Second St., Philadelphia, Pa.

- '20. KLINE, E. K., *Chemistry, Public Health, Physics*.....
Public Health Laboratories, Toledo
- '10. KNOWER, HENRY MCE. ('13; F), *Anatomy, Biology*.....
Medical College, Univ. of Cincinnati, Cincinnati
- '20. KORNHAUSER, SIDNEY ISAAC, *Zoology*....Denison Univ., Granville
- '12. KOSTIR, WENCEL J., (F), *Zoology*.....O. S. U., Columbus
- '20. KRAATZ, WALTER C., *Zoology, Entomology*.....
Dept. of Zoology and Entomology, O. S. U., Columbus
- '09. KRECKER, FREDERICK H. (F), *Zoology*.....O. S. U., Columbus
- '20. KREIDER, HENRY R., *Chemistry, Public Health, Physics*.....
Univ. of Toledo, Toledo
- '13. KUMLER, RALPH W., *Geology, Physiography*...Hercules Club, Parlin, N. J.
- '14. KURTZ, S. AARON, *Botany, Geology, Physics, Chemistry, Archeology*.....
Charleston School, Lorain
- '12. LAKE, CHAS. H., *Physics*.....Cleveland
- '09. LAMB, G. F. (F), *Geology*.....233 Hartshorn St., Alliance
- '19. LAMPE, LOIS, *Botany*.....Dept. of Botany, O. S. U., Columbus
- '96. LANDACRE, F. L. (F), *Zoology*.....O. S. U., Columbus
- '08. LIBRARY, OHIO STATE UNIVERSITY.....Columbus
- '91. LLOYD, JOHN URI (F).....309 W. Court St., Cincinnati
- '15. LORD, H. C. (F), *Astronomy, Mathematics*.....O. S. U., Columbus
- '18. LOWRY, PHIL R., *Entomology, Zoology, Botany*.....
Dept. of Zoology and Entomology, O. S. U., Columbus
- '15. LUTZ, DEXTER, *Biology, Agriculture, Meteorology*.....O. S. U., Columbus
- '10. MARK, CLARA GOULD (F), *Geology, Botany*, 270 S. State St., Westerville
- '20. MARSHALL, HELEN (*), *Psychology*.....O. S. U., Columbus
- '19. MATEER, FLORENCE, *Psychology*, Bureau of Juvenile Research, Columbus
- '93. MATHEWS, MARY E.....Painesville
- '10. McAVOY, BLANCHE, *Biology*.....109 Foley Road, Price Hill, Cincinnati
- '16. McCLOY, JAMES H., *Physics*.....Westerville
- '06. McKEAN, T. L., *Botany*.....Berea
- '14. MCPHERSON, WM. (F), *Chemistry*.....O. S. U., Columbus
- '14. MECKSTROTH, GUSTAV A. (F), *Botany, Entomology*.....
Bureau of Plant Industry, Washington, D. C.
- '12. MENDENHALL, T. C. (F), *Physics*.....Ravenna
- '00. MERCER, W. F. (F), *Biology*.....Ohio University, Athens
- '09. METCALF, C. L. (F), *Entomology, Zoology*.....
Dept. of Zoology and Entomology, O. S. U., Columbus
- '08. METCALF, M. M. (F), *Zoology*.....Oberlin
- '03. METCALF, ZENO P., *Ornithology*.....State College, W. Raleigh, N. C.
- '14. METZGER, ALBERT C. D., *Chemistry, Ornithology, Geography*.....
380 Deshler Ave., Columbus
- '20. MILLER, DAYTON C. (F), *Physics*, Case School of Applied Sci., Cleveland
- '98. MILLS, W. C. (F), *Archeology, Biology*.....O. S. U., Columbus
- '20. MINCHIN, HOWARD D., *Physics*.....O. S. U., Columbus
- '18. MITCHELL, ROGER I., *Entomology*.....Sta. E, Route 6, Columbus
- '19. MITRA, SWARNA KUMER, *Botany*.....
N. C. Agricultural and Technical College, Greensboro, N. C.
- '12. MORE, LOUIS T. (F), *Physics*.....Univ. of Cincinnati, Cincinnati

- '14. MORNINGSTAR, HELEN (F), *Geology*...1275 Franklin Ave., Columbus
- '91. MORREY, C. B. ('19; F) *Bacteriology*.....O. S. U., Columbus
- '06. MORSE, W. C. (F), *Geology*..Dept. of Geology, Agricultural College, Miss.
- '91. MOSELEY, E. L. (F), *Zoology, Botany, Physiography*.....
State Normal College, Bowling Green
- '19. MOSHER, EDNA, *Entomology*..Univ. of New Mexico, Albuquerque, N. M.
- '13. MOTE, DON C. (F), *Zoology, Entomology*.....
Office of State Entomologist, Phoenix, Ariz.
- '15. NAPPER, CHARLES W., *Geology*.....Greenfield
- '05. NELSON, JAMES A. (F), *Zoology, Embryology*.....Mt. Vernon
- '09. NICHOLS, SUSAN P., *Botany*.....257 Elm St., Oberlin
- '93. OBERHOLSER, H. C.2805 Eighteenth St., N. W., Washington, D. C.
- '99. ODENBACH, F. L., *Meteorology*.....St. Ignatius College, Cleveland
- '16. OKEY, CATHARINE W., *Anatomy, Zoology*.....514 Butler St., Marietta
- '13. O'NEAL, CLAUDE E. (F), *Botany*.....Ohio Wesleyan Univ., Delaware
- '17. ORCUTT, RUTH, *Botany, Zoology*.....Granville
- '98. OSBORN, HERBERT (F), *Entomology, Zoology*.....O. S. U., Columbus
- '96. OSBURN, RAYMOND C. (F), *Zoology, Ichthyology*.....
Botany and Zoology Bldg., O. S. U., Columbus
- '19. OTIS, CHARLES H. (F), *Botany*.....
Biological Laboratory, Western Reserve Univ., Cleveland
- '18. PARKS, T. H. (F), *Entomology*..Botany and Zoology, Bldg. O.S.U., Columbus
- '14. PHILLIPS, RUTH L., *Biology and Allied Sciences*, Western College, Oxford
- '19. PINTNER, RUDOLF (F), *Psychology*.....O. S. U., Columbus
- '15. PLOWMAN, AMON B. (F), *Botany, Physiology, Zoology*.....
346 Crown St., Akron
- '15. PRATT, DELBERT R., *Botany, Zoology, Bacteriology*...560 Cherry St., Marion
- '12. PROSE, CHAS. T., *Physics*.....1333 Maple Ave., Zanesville
- '20. PUMPHREY, ELVA, *Biology*.....Ohio Wesleyan Univ., Delaware
- '12. RANKIN, JOHN P., *Biology, Medicine*.....415 Earl Court, Elyria
- '19. REAMER, JEANNETTE, *Psychology*.....1751 Franklin Park So., Columbus
- '16. REED, CARLOS I., *Physiology*.....
Dept. of Physiology, Univ. of Kansas, Lawrence, Kan.
- '16. REEDER, C. W.....Library, O. S. U., Columbus
- '14. REESE, CHAS. A., *Zoology, Entomology*.....Morgantown, W. Va.
- '01. RICE, EDWARD L. (F), *Zoology*.....Delaware
- '19. RIDENOUR, ALICE LOUISE, *General Science*.....London
- '14. ROBINSON, J. M., *Entomology*.....Auburn, Ala.
- '19. ROGERS, A. SOPHIE, *Psychology*...Dept. of Psychology, O. S. U., Columbus
- '13. ROGERS, CHARLES G. (F), *Physiology*.....378 Reamer Place, Oberlin
- '14. ROOD, ALMON N., *Botany*.....R. F. D. No. 2, Phalanx Station
- '00. ROUEBUSH, LOWELL.....R. F. D. No. 3, New Richmond
- '10. RUSH, R. C., *Conchology*.....Hudson
- '18. SAMPSON, HOMER C. (F), *Botany*.....O. S. U., Columbus
- '97. SCHAFFNER, JOHN H. (F), *Botany*.....O. S. U., Columbus
- '13. SCHEAR, E. W. E., *Biology*.....107 W. Park, Westerville
- '07. SCHEFFEL, EARL R., *Geology*.....
Dept. of Geology, Univ. of West Virginia, Morgantown, W. Va.
- '12. SCHROYER, CHARLES R., *Geology*.....Worthington

- '19. SCHWEIKHER, F. P., *Nature Study, General Science, Agriculture, Botany, Zoology*.....1623 Compton Rd., Cleveland
- '16. SCOTT, ERNEST (F), *Pathology*, Medical College, N. Park St., Columbus
- '15. SEARS, PAUL B., *Botany, Entomology*.....
Dept. of Botany, Univ. of Nebraska, Lincoln, Neb.
- '91. SELBY, A. D. (F), *Botany*.....Experiment Station, Wooster
- '14. SEYMOUR, RAYMOND JESSE (F), *Physiology, Zoology, Botany*.....
Dept. of Physiology, O. S. U., Columbus
- '12. SHADLE, ALBERT, *Zoology*.....
Dept. of Biology, Univ. of Buffalo, Buffalo, N. Y.
- '11. SHARP, MRS. KATHARINE DOORIS, *Botany, Geology*.....London
- '08. SHATZER, C. G. (F).....1003 Woodlawn, Springfield
- '13. SHEARD, CHARLES, *Physics*.....367 W. Tenth Ave., Columbus
- '15. SHETRONE, H. C., *Archeology*.....Arch. and Hist. Museum, Columbus
- '13. SHIDELER, W. H. (F), *Geology*, U.S. Geological Survey, Washington, D. C.
- '10. SHILLIDAY, C. L., *Zoology*.....Gettysburg, Pa.
- '19. SHOLLENBERGER, F. J., *Physics*.....Mount Union College, Alliance
- '15. SHUMAN, S. C., *Botany*.....Fitchville
- '13. SHUMAN, W. L., *Botany*.....Chicago Junction
- '09. SIM, ROBERT J., *Ornithology, Zoology*.....Jefferson
- '19. SKINNER, CHARLES R., *Physics*.....334 N. Sandusky St., Delaware
- '08. SMITH, ARTHUR L., *Geology*.....Valley Crossing
- '02. SNYDER, F. D., *Zoology, Ethnology*.....Ashtabula
- '17. SPEAKS, JOHN C., *Ichthyology, Ornithology*.....Columbus
- '12. SPECKMAN, W. N., *Biology, Geology*.....Libertyville, Lake Co., Ill.
- '18. SPOHR, CARL F. (F), *Medical Sciences*...Medical Dept., O. S. U., Columbus
- '12. STANLEY, CLYDE M., *Zoology*.....High School, Alliance
- '05. STAUFFER, CLINTON R. (F), *Geology*.....
Univ. of Minnesota, Minneapolis, Minn.
- '16. STEHLE, MABEL E., *Zoology, Entomology*...Clemson College, Clemson, S. C.
- '94. STERKI, VICTOR, *Conchology, Botany*.....New Philadelphia
- '03. STICKNEY, M. E. (F), *Botany*.....Granville
- '20. STONE, JULIUS F. (*), *General Science*.....Grandview, Columbus
- '15. STOUT, HARRY O., *Botany, Geology, Agriculture, Zoology*.....
Bowling Green High School, Bowling Green
- '08. STOUT, W. E. (F), *Chemistry, Ceramics, Geology*.....
291 E. Northwood Ave., Columbus
- '20. STOVER, ERNEST L., *Botany*.....
Botany and Zoology Bldg., O. S. U., Columbus
- '09. STOVER, W. GARFIELD (F), *Botany, Plant Pathology*, O. S. U., Columbus
- '03. SWEZEY, OTTO H.....925 Twelfth Ave., Honolulu, Hawaii
- '19. TAYLOR, MRS. BAYARD, *Botany, Ornithology*.....West Jefferson
- '14. THAYER, WARREN N., *Geology*.....P. O. Box 525, Cincinnati
- '19. THOMAS, EDWARD S., *Ornithology*.....81 Ruggery Bldg., Columbus
- '15. THOMAS, ROY C., *Botany, Zoology, Geology*.....R. F. D. 5, Mt. Gilead
- '20. TIFFANY, LEWIS H., *Botany*...Dept. of Botany, O. S. U., Columbus
- '20. TODD, FRANK E., *Entomology, Zoology, Plant Pathology*.....
Arizona Commission of Agriculture and Horticulture, Yuma, Arizona
- '94. TODD, JOSEPH H., *Geology, Archeology*....Christmas Knoll, Wooster

- '19. TOOPS, HERBERT A., *Psychology*.....102 Euclid Ave., Waterbury, Conn.
 '15. TRANSEAU, EDGAR N. (F), *Botany*.....O. S. U., Columbus
 '19. TRETTEEN, A. W., *Psychology*.....Toledo Univ., Toledo
 '15. TROTT, T. ELMER, *Mathematics, Astronomy*...221 Ridgewood Ave., Alliance
 '18. TUCKER, W. M., (F), *Geology*.....Indiana University, Bloomington, Ind.
 '12. TURNER, CLARENCE L. (F), *Zoology*.....Beloit College, Beloit, Wis.
 '12. UNNEWEHR, EMORY C., *Physics*.....Baldwin-Wallace College, Berea
 '15. VAN CLEVE, M. R., *Physical Geography, Botany*...542 Ardin Place, Toledo
 '14. VERWIEBE, WALTER A., *Geology*.....
 Freeport and Mexican Fuel Oil Corporation, Apartido 241, Tampico, Mexico
 '15. VIVIAN, ALFRED (F), *Agriculture, Chemistry*.....O. S. U., Columbus
 '19. WAGNER, M. CHANNING, *Physics*.....941 Harriett St., N. W., Canton
 '04. WAITE, F. C. (F), *Anatomy, Zoology*.....1353 E. Ninth St., Cleveland
 '18. WALLER, A. E. (F), *Botany*.....O. S. U., Columbus
 '02. WALTON, L. B. (F), *Biology*.....Gambier
 '98. WEBB, R. J., *Botany*.....Garrettsville
 '19. WEISS, ALBERT P. (F), *Psychology, Biology*.....O. S. U., Columbus
 '11. WELLS, B. W., *Botany*.....
 North Carolina Agricultural College, N. Raleigh, N. C.
 '13. WELLS, G. R. ('19; F), *Psychology*.....
 Hartford Theological Seminary, Hartford, Conn.
 '96. WERTHNER, WILLIAM B. (F), *Botany*.....1525 Riverside Drive, Dayton
 '01. WESTGATE, LEWIS G. (F), *Geology*.....Delaware
 '18. WICKLIFF, E. L., *Zoology, Ornithology*.....
 Dept. of Zoology and Entomology, O. S. U., Columbus
 '15. WILLIAMS, JOHN N., *Mathematics, Physics, Chemistry*.....
 227 W. Reynolds St., Urbana
 '13. WILLIAMS, SAMUEL R. (F), *Physics*.....154 Forest St., Oberlin
 '03. WILLIAMS, STEPHEN R. (F), *Biology*.....300 E. Church St., Oxford
 '97. WILLIAMSON, E. B., *Entomology*.....Bluffton, Ind.
 '08. WILSON, STELLA S., *Geography, Geology*.....Station B, Route 7, Columbus
 '15. WITHROW, JAMES R. (F), *Chemistry, Mineralogy*...O. S. U., Columbus
 '92. WRIGHT, G. FREDERICK (F), *Geology*.....Oberlin
 '19. WRIGHT, IVAN G., *Psychology*.....Lenox Hotel, Columbus
 '20. WURDACK, MARY E. (*), *Botany*.....29 Twelfth Ave., Columbus
 '15. WYKOFF, HARRY S., *Biology, Botany*.....2234 Shunk Ave., Alliance
 '17. YAMPOLSKY, CECIL, *Botany, Zoology, Genetics*.....
 Madan, Sumatra, Dutch East Indies
 '03. YORK, HARLAN H., *Botany*...West Virginia Univ., Morgantown, W. Va.
 '06. YOUNG, R. A., *Botany*.....120 Chestnut Ave., Takoma Park, D. C.

Total Membership—299

REPORT

OF THE

THIRTIETH ANNUAL MEETING

OF

The Ohio Academy of Science

The Thirtieth Annual Meeting of the Ohio Academy of Science was held at Ohio State University, Columbus, Ohio, May 14 and 15, 1920, under the presidency of Professor Frederick C. Blake. Sixty-nine members were registered as in attendance; thirty new members were elected.

GENERAL PROGRAM.

FRIDAY, MAY 14.

11:00 A. M.—Business Meeting.

12:30 P. M.—Luncheon.

2:00 P. M.—Reading of Papers in General Session.

3:30 P. M.—Lecture by Professor Dayton C. Miller, Case School of Applied Science, Cleveland, on "Photographing Sound Waves from Large Guns and Projectiles."

4:30 P. M.—Reading of Papers in Sectional Meetings.

6:00 P. M.—Dinner.

7:30 P. M.—Address by the President of the Academy, Professor F. C. Blake, Ohio State University, Columbus, on "The Einstein Theory of Relativity and Gravitation."

8:30 P. M.—Demonstrations and Social Gathering.

SATURDAY, MAY 15.

9:00 A. M.—Adjourned Business Meeting.

10:00 A. M.—Reading of Papers in Sectional Meetings.

MINUTES OF BUSINESS MEETINGS.

The first business session was called to order by President Blake, at 11:00 A. M., on Friday, May 14. An adjourned session was held at 9:00 A. M. on the following day.

The appointment of the following committees for the meeting was announced by the chair:

Committee on Membership—C. L. Metcalf, J. W. Bridges, C. W. Reeder.

Committee on Resolutions—F. H. Herrick, E. L. Fullmer, W. G. Hormell.

The following Auditing Committee was elected by the Academy: J. W. Bridges, R. J. Seymour.

The following Nominating Committee was elected by the ballot of the Academy: R. C. Osburn, T. M. Hills, F. C. Blake.

Report of the Secretary.

The following report by the Secretary was received and ordered filed.

May 14, 1920.

To the Ohio Academy of Science:

Much of the work of the Secretary has been in connection with the Executive Committee and other committees, and is covered by the committee reports; much of the balance has been mere routine.

The circular of information was reprinted, as directed by the last annual meeting, and distributed with the preliminary announcement of this meeting.

A brief report of the Twenty-Ninth Annual Meeting was prepared for *Science*, and appeared in the number for August 1.

Arrangements were made with the Publication Committee for the appearance of the full report in the first issue of the OHIO JOURNAL OF SCIENCE for the current year; and it is hoped that this may become the established custom.

The usual notices of the present meeting were sent to the Columbus dailies.

In conference with the President, the Secretary arranged with Dr. S. J. Barnett, of the Carnegie Institution of Washington, to represent the Ohio Academy at a convention of the National Public Works Department Association, held in Washington, D. C., on January 13th and 14th. In reporting his attendance at the convention, Dr. Barnett writes as follows: "I certainly approve most strongly of the work of the Association, and I believe the movement worthy of any help the Academy can give it by passing a resolution in its favor, by interviewing Ohio Representatives and Senators, and by financial assistance if that should be practicable. I hope the movement is successful, and I am

glad to have had an opportunity to do a very little for it." The Secretary has the full minutes of this convention on file and available for any members interested. They contain the following statement: "The Finance Committee notified the Convention that the need of money was acute" and "recommended that each participating society be asked to assess their members at least one dollar per man." Nothing further has been heard concerning this matter.

Two requests for data concerning the membership and research funds of the Academy have been received from the National Research Council, and the desired information has been supplied.

On April 23d and 24th the Secretary represented the Ohio Academy of Science at the very interesting Semi-Centennial of the Wisconsin Academy of Sciences, Arts, and Letters in Madison. This was done at the request of the President, and was made financially possible, without expense to the Academy or to the Secretary, through the generosity of a group of Columbus members, to whom the Secretary wishes to express his very genuine thanks, although he does not know their names.

Respectfully submitted,

EDWARD L. RICE, *Secretary*.

Report of the Treasurer for the Year 1919-20.

The report of the Treasurer was received as follows, and referred to the Auditing Committee, whose report is appended.

May 15, 1920.

The Treasurer's report contains only such statements as presented before May 15th. There are a number of bills outstanding that will have to be taken care of in the next annual Treasurer's report. This accounts for the apparent decrease in the amount of the Treasurer's expenses for the current year but will be increased by the bills included in next year's account.

Independent Print Shop, Delaware, Ohio.....	\$ 45.25
Spahr & Glenn, Printers, Columbus, Ohio.....	2.50
E. L. Rice, Secretarial expenses.....	8.14
A. E. Waller, Treasurer's expenses.....	5.20
T. C. Mendenhall, Coupons cashed from Liberty Bond.....	4.15
150 paid subscriptions to Journal.....	150.00

Liabilities.....	\$215.24
Assets, balance in bank, May 13, 1920.....	\$363.90
Received from C. W. Reeder from sale of publications.....	16.90

Total assets.....	\$380.80
Less.....	215.24

\$165.56

Respectfully submitted,

A. E. WALLER, *Treasurer*.

The above accounts have been audited and found correct.

J. W. BRIDGES,
R. J. SEYMOUR,
Auditing Committee.

Report of the Executive Committee.

The report of the Executive Committee was received as follows and ordered filed.

May 14, 1920.

To the Ohio Academy of Science:

Two meetings of the Executive Committee have been held during the year. At the first, January 21st, all members were in attendance; at the second, held this morning, the following were present: F. C. Blake, A. E. Waller, Wm. McPherson, E. L. Rice.

A considerable part of the work of the Committee has been carried on through correspondence.

The action of the President and Secretary, delegating Dr. Barnett to represent the Academy at the convention of the National Public Works Department Association on January 13th, was approved.

The year has been a phenomenal one in the matter of resignations on the part of officers; and the Committee has made the following appointments to fill vacancies:

A. E. Waller, Treasurer, vice W. J. Kostir.
C. D. Coons, Vice-President for Physics, vice M. E. Graber.
J. A. Culler, Vice-President for Physics, vice C. D. Coons.
T. M. Hills, Vice-President for Geology, vice J. E. Hyde.

Sixteen new members have been elected, subject to the ratification of the present meeting.

In selecting May 14th and 15th as the date of the present meeting, the Committee hoped to secure a date at once early enough to avoid the rush of the close of the school and college year and late enough to afford a reasonable prospect of good weather for possible field trips. Several complaints have been received. Does the Academy wish to fix the date for next year or to give any instructions to the incoming Executive Committee?

No invitations were received for the present meeting except the very welcome and very cordial standing invitation from Columbus. Tentative invitations from Alliance and Cleveland were postponed to a later date.

Perhaps the most important action of the Committee was the completion of the affiliation with the American Association for the Advancement of Science, authorized by the Academy at its last meeting and referred to the Committee with power to act. By the terms of this affiliation the Academy surrenders nothing of its present autonomy, but becomes entitled to representation in the Council of the American

Association. It is hoped that the affiliation may lead to an increase in the membership of both societies and to a mutually beneficial co-operation. The essentials of the plan are as follows:

1. All arrangements for the affiliation must be completed within the first six months of 1920.

2. The Treasurer of the Ohio Academy is authorized to collect the joint dues from members of the two organizations and to transmit the proper share to the Treasurer of the A. A. A. S.

3. By action of the last Annual Meeting, the annual dues of the Ohio Academy of Science are now two dollars; those of the A. A. A. S. are five dollars. The joint dues for members of both societies are six dollars, of which four dollars go to the A. A. A. S. and two dollars to the Ohio Academy.

4. Members of the Ohio Academy who are not members of the A. A. A. S. may become such without the payment of the usual initiation fee of five dollars.

5. Members of the Academy who do not become members of the A. A. A. S. continue to pay only the dues of the Ohio Academy.

6. All members of the Ohio Academy who have already paid the five dollar 1920 dues in the A. A. A. S. may obtain a rebate of one dollar from the Treasurer of the Ohio Academy upon application accompanied by proper receipt.

No further steps have been taken in connection with the proposed affiliation with the Ohio Association of Technical Societies.

Respectfully submitted,

EDWARD L. RICE, *Secretary,*
For the Committee.

Report of the Publication Committee.

The following report of the Publication Committee was received and ordered filed. The recommendations embodied in the report were approved by the Academy.

The only publication issued during the year was the Annual Report of the Twenty-ninth Meeting (Proc. Ohio Acad. Sci., Vol. VII, Part 4, pp. 87-116.) The Secretary's report was printed in the November number of the OHIO JOURNAL OF SCIENCE. It is recommended that this become the regular procedure which will insure publication the same year as the annual meeting and make it possible for the members to have the report before the annual dues for the following year are collected. The committee believes that the Academy should continue the publication of special reports from time to time, as in the past. In this way the standing of the Academy outside of the state would be advanced.

Respectfully submitted,

JOHN H. SCHAFFNER, *Chairman.*

Report of the Trustees of the Research Fund.

The following report of the Trustees of the Research Fund was received and ordered filed. The financial portion of the report was referred to the Auditing Committee, whose report is appended.

To the Ohio Academy of Science:

The Trustees of the Research Fund submit the following report for the year ending May 1, 1920:

During the year payments have been made to the following persons for the purposes indicated:

F. C. Blake: For the purchase of a specially sensitive galvanometer for use in an investigation already under way, and for materials purchased under previous grants for which bills had not been rendered. The entire cost of the galvanometer was paid from the Research Fund and it thus becomes the property of the Academy. It will be available for future use by any other member of the Academy who may need such an instrument in any investigation which has received the approval of the Trustees of the Research Fund. It is the desire and policy of the Trustees to give preference, as far as is possible, to grants of this kind where the expenditure of the money not only aids the investigator but also results in a valuable addition to the material resources of the Academy.

Paul B. Sears: To aid in the study of Ohio vegetation.

W. H. Bucher: To aid in the making of a geological map of the disturbed area in Adams County, Ohio.

L. B. Walton: For a continuation of his study of fresh water organisms.

Miss Elsie Jordan: For work in relabeling the Harper collection of Naiades (under the direction of W. H. Bucher).

In grants already made there are unexpended balances, due on the rendering of a satisfactory statement, to

A. E. Waller: For aid in a study of Ohio vegetation; to

L. B. Walton and W. H. Bucher: For the objects indicated above; and to

L. C. Hopkins: To aid in making a collection of Pteridophytes, and in the determination of the water-shed of Ohio. In these last two the expenditure is to be mostly for the printing and distribution of circular letters.

Below is a statement of receipts, expenditures, and liabilities, according to which there is an available balance of about four hundred dollars from which grants will be made upon application approved by the Trustees.

Vouchers for all expenditures are submitted herewith.

RECEIPTS.

Cash in bank, May 30, 1919.....	\$678.57
Interest on Liberty Bond, June 2, 1919.....	7.45
Check from Mr. McMillin, April 12, 1920.....	250.00
Interest on Liberty Bond, April 21, 1920.....	31.87
	\$967.89

EXPENDITURES.

F. C. Blake, June 12, 1919.....	\$ 31.92
F. C. Blake, Oct. 10, 1919.....	150.00
Paul B. Sears, Nov. 3, 1919.....	22.44
W. H. Bucher, Nov. 12, 1919.....	89.06
L. B. Walton, Dec. 16, 1919.....	17.29
Elsie Jordan, Dec. 16, 1919.....	12.50
	323.21

Cash balance in bank, May 1, 1920.....	\$644.68
Total assets, (Liberty Bond at par).....	\$1,144.68

LIABILITIES (under grants).

A. E. Waller.....	\$75.00
W. H. Bucher.....	98.44
L. C. Hopkins.....	50.00
L. B. Walton.....	20.31
	243.75

Excess of available assets above liabilities.....	\$400.93
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(Signed),

T. C. MENDENHALL,
HERBERT OSBORN.

The financial statement in the above report has been audited and found correct.

J. W. BRIDGES,
R. J. SEYMOUR,
Auditing Committee.

Report of the Library Committee.

For the Library Committee, Mr. Reeder, of the Ohio State University Library, presented the following report, which was received and ordered filed.

May 14, 1920.

To the Ohio Academy of Science:

The Library Committee begs leave to submit the following report:

(1) The sale of publications during the year has been above normal, the total amount received being \$27.75. On July 15, 1919, \$10.85 of this amount was turned over to Mr. Kostir, and the balance \$16.90 is now ready for the Treasurer.

(2) The Proceedings of the 29th Annual Meeting appeared in the OHIO JOURNAL OF SCIENCE for November, 1919, and a few months

later the reprints were received and mailed to persons whose names appear in that report on the membership roll. The report was also sent to the sixty-five institutions on the exchange list.

(3) The receipt of exchanges by the Academy has been about as usual with a slight increase in the foreign group due to a resumption of near-normal transportation conditions and the clearing out of accumulations by the International Exchange Service of the Smithsonian Institution.

(4) During the year a thousand cards were added to the Union Catalog of Scientific Periodicals by the Oberlin College Library. It is known that other libraries have contributions of cards ready whenever there is need of them, but the matter has not been pushed on account of the difficulty experienced in the large libraries in keeping even with current work on account of depleted staffs.

(5) During the past year the University Library made loans of 42 books to nine Ohio Colleges. It is not known whether or not the professors desiring these books are members of the Ohio Academy, but it is hoped they are. The library offers to lend to any scientist in the Academy, through his institutional library, any publication not needed for immediate use. This service ought to be developed more extensively and the Library stands ready to discharge its obligation to the men and women of the Ohio Academy who are engaged in research and need more book facilities than are available in their libraries.

Respectfully submitted,

C. W. REEDER.

Report of the Committee on Legislation.

The following report of the Committee on Legislation was received and ordered filed. The Committee was continued.

Your Committee on Legislation is unable to report any very substantial progress in the matter of securing state support but would recommend that the committee be continued or another committee appointed to continue the effort. Owing to the session of last winter being an adjourned session and averse to taking up new measures and also the varied questions of intense debate that developed during the session and the attitude of members toward the introduction of any new measures involving new appropriations, the time seemed inopportune. Moreover, there are one or two points which it seems desirable to clear up before offering a specific form of bill.

For the information of the members we submit the following draft of a bill which embodies the points it seems desirable to include.

It may be noted that there is some question as to the form in which an act may best be stated which provides that the service of the Academy may be mandatory while the obligation of the state can only operate during the life of an appropriation which under the constitution is limited to the biennial period. The committee has attempted to include in one bill the provision that the Academy may function as an advisory body for the state and also that the state shall support the Academy in the matter of publication and expenses.

Suggestions from members as to the best manner in which this can be accomplished will be welcomed by the committee if continued.

A BILL.

To provide for the publication of the Proceedings of the Ohio Academy of Science and Support and Service of the Academy.

Be it Enacted by the Eighty-third General Assembly of the State of Ohio:

SECTION 1. That there is hereby appropriated the sum of \$2,000 per annum during the biennium for the Ohio Academy of Science for the support of its publications and for the payment of expenses of the society which may include the salary of a secretary.

SEC. 2. The Proceedings of the Academy, aside from its regular distribution to members and exchanges, shall be distributed one copy to each public library and to each university, college and first grade high school in the state. The exchanges received shall be kept available to the citizens of the state through the library of the State University or such other channel as may be determined.

SEC. 3. The services of the Academy shall be available to the state or any of its officers in any matter in which the consideration of scientific facts, policies or problems is involved, and the officers of the state may call upon the Academy through its properly elected officers or committees appointed by its officers for such consultation and advice as may be of service to them in their duties, the members of such committees to receive no compensation for this service further than necessary expenses of travel or other outlay in the performance of their duty and no member of the Academy while serving as a member on such committee shall be eligible for expert service involving compensation from the state. The President of the Academy shall serve as the medium of communication with the Academy.

Respectfully submitted,

HERBERT OSBORN,
T. C. MENDENHALL,
EDWARD L. RICE.

Report of the Committee on War Roll.

The following report of the Committee on War Roll was received and ordered filed. The Committee was discharged.

To the Ohio Academy of Science:

The committee appointed a year ago to continue the collection of data concerning the war record of Academy members has held no meeting during the year; but a call for the desired information was included this year, as last, in the preliminary notice of the Annual Meeting. Forty members responded to this call. The data collected are in the possession of the Secretary, and will be transferred for permanent record to the cards of the Secretary's membership catalog.

Respectfully submitted,

EDWARD L. RICE, *Secretary,*
For the Committee.

Report of the Committee on Election of Fellows.

The following report of the Committee on Election of Fellows was accepted and ordered filed.

May 14, 1920.

To the Ohio Academy of Science:

The Constitution, as amended in 1919, delegates the election of fellows to a joint committee consisting of the Vice-Presidents and the Executive Committee. Nine of the eleven votes are necessary to an election.

Much of the work of the joint committee has been done by correspondence; but a meeting held this morning gave opportunity for free discussion. Seven members of the committee were present at this meeting; the other four were represented by more or less fully instructed proxies. The entire mode of procedure has been as follows:

As only fellows are to be eligible to office and to membership in the Executive Committee, it was agreed that all past and present Officers and Executive Committee members should become fellows. These number fifty-six.

Membership lists were then mailed to all members of the Committee, to be checked as ballots and returned to the Secretary for tabulation. Ten of the eleven members of the Committee voted. No member of the Academy received the necessary nine ballots, although two lacked but one vote each. The names of members receiving any votes were then mailed to the Committee members to serve as a list of nominations for consideration at this morning's meeting.

From this list fifty-eight fellows were elected, making the total number one hundred and fourteen. The fellows will be designated by some distinguishing mark in the next list of members published.

Your committee believe that their work has been conservative. They have endeavored to guard against the election of any undesirable fellows; desirable candidates have undoubtedly been omitted. Such errors can be easily rectified by succeeding committees.

Respectfully submitted,

EDWARD L. RICE, *Secretary,*
For the Committee.

Election of Officers.

The following officers and committee members for 1920-21 were elected by the ballot of the Academy:

President—MR. W. H. ALEXANDER, U. S. Weather Bureau, Columbus.

Vice-Presidents:

Zoology—Professor F. H. KRECKER, Ohio State University, Columbus.

Botany—Professor C. H. OTIS, Western Reserve University, Cleveland.

Geology—Professor W. H. BUCHER, University of Cincinnati, Cincinnati.

Physics—Professor D. C. MILLER, Case School of Applied Science, Cleveland.

Medical Sciences—Professor ERNEST SCOTT, Ohio State University, Columbus.

Psychology—Professor H. A. AIKINS, Western Reserve University, Cleveland.

(On the resignation of Professor AIKINS, the Executive Committee appointed Professor J. W. BRIDGES, Ohio State University, Columbus, to fill the vacancy.)

Secretary—Professor E. L. RICE, Ohio Wesleyan University, Delaware.

Treasurer—Dr. A. E. WALLER, Ohio State University, Columbus.

Elective Members of Executive Committee—Professor F. C. BLAKE, Ohio State University, Columbus; Professor C. G. SHATZER, Wittenberg College, Springfield.

Member of Publication Committee—Professor L. B. WALTON, Kenyon College, Gambier.

Trustee of Research Fund—Professor HERBERT OSBORN, Ohio State University, Columbus.

Member of Library Committee—Professor F. O. GROVER, Oberlin College, Oberlin.

Representatives on Editorial Board of Ohio Journal of Science:

Zoology—Professor R. A. BUDINGTON, Oberlin College, Oberlin.

Botany—Professor BRUCE FINK, Miami University, Oxford.

Geology—Professor G. D. HUBBARD, Oberlin College, Oberlin.

Physics—Professor S. J. M. ALLEN, University of Cincinnati, Cincinnati.

Medical Sciences—Professor F. C. WAITE, Western Reserve University, Cleveland.

Psychology—Professor H. A. AIKINS, Western Reserve University, Cleveland.

Election of Members.

The Membership Committee reported fourteen names for election to membership; sixteen additional names, previously approved by the Executive Committee and marked with (*) in the following list, were presented for ratification. All were elected, as follows:

*Anderson, Donald B., Botany; Botany and Zoology Bldg., Ohio State University, Columbus.

Arps, G. F., Psychology; Ohio State University, Columbus.

*Balduf, Walter V., Zoology; Dept. of Zoology and Entomology, Ohio State University, Columbus.

Berger, F. L., Physics; 121 E. Long St., Ada.

*Bohl, Ray Anderson, Anatomy, Zoology; 838 May St., Akron.

*Bowman, H. H. M., Botany, Zoology; University Science Hall, Cherry and Page Streets, Toledo.

*Braun, E. Lucy, Botany; 2702 May Street, Cincinnati.

- *Brewer, P. H., Chemistry; McKinley High School, Canton.
- Burt, Harold E., Psychology; Department of Psychology, Ohio State University, Columbus.
- Ditto, R. C., Physics; 316 W. Eighth Avenue, Columbus.
- Evans, Wm. Lloyd, Chemistry; Dept. of Chemistry, Ohio State University, Columbus.
- Guyton, F. E., Zoology, Entomology; Dept. of Zoology and Entomology, Ohio State University, Columbus.
- *Harper, Arthur R., Botany, Zoology; 2479 Findlay Ave., Columbus.
- Henderson, Wm. E., Chemistry; Dept. of Chemistry, Ohio State University, Columbus.
- Householder, F. F., Physics; Municipal University of Akron, Akron.
- Howard, C. C., Chemistry; Columbus.
- Huber, Lawrence L., Zoology, Entomology; Dept. of Zoology and Entomology, Ohio State University, Columbus.
- Kennedy, Clarence H., Entomology; Dept. of Zoology and Entomology, Ohio State University, Columbus.
- *Kline, E. K., Chemistry, Public Health, Physics; Public Health Laboratories, Toledo.
- *Kornhauser, Sidney Isaac, Zoology; Denison University, Granville.
- *Kraatz, Walter C., Zoology, Entomology; Dept. of Zoology and Entomology, Ohio State University, Columbus.
- *Kreider, Henry R., Chemistry, Public Health, Physics; University of Toledo, Toledo.
- Miller, Dayton C., Physics; Case School of Applied Science, Cleveland.
- Minchin, Howard D., Physics; Columbus.
- *Pumphrey, Elva, Biology; Dept. of Biology, Ohio Wesleyan University, Delaware.
- *Root, Eunice, Botany; Botany and Zoology Bldg., Ohio State University, Columbus.
- *Schweikher, F. P., Nature Study, General Science, Agriculture, Botany, Zoology; 1623 Compton Road, Cleveland.
- *Stover, Ernest L., Botany; Botany and Zoology Bldg., Ohio State University, Columbus.
- *Tiffany, Lewis H., Botany; Dept. of Botany, Ohio State University, Columbus.
- Todd, Frank E., Entomology, Zoology, Plant Pathology; Assistant State Entomologist, Yuma, Arizona.

Report of Committee on Necrology.

No deaths of members during the year were reported, and the report of the Committee on Necrology was happily omitted.

Report of Committee on Resolutions.

The following resolutions were presented by the Committee on Resolutions and adopted by the Academy.

1. The Academy desires to thank the Local Committee and the officers of Ohio State University for their efforts in making the Thirtieth Annual Meeting a success.

2. The Academy wishes to record an expression of its thanks to Mr. Emerson McMillin for his continued and generous support of scientific research in Ohio.

3. The Academy would also thank Professor Dayton C. Miller for an illustrated lecture upon his ingenious experiments in "Photographing Sound Waves from Large Guns and Projectiles."

4. The Academy further expresses its appreciation to the Secretary for his sustained and efficient services in forwarding its interests and thus contributing to the success of its meetings and work.

(Signed), F. H. HERRICK,
E. L. FULLMER,
W. G. HORMELL.

Conservation of Platinum and Potassium.

The following resolutions concerning the use and abuse of platinum and potassium were introduced by Professor J. R. Withrow and unanimously adopted by the Academy. Professor Withrow and the Secretary were appointed a special committee to secure the publicity of the resolutions and to urge the importance of the subject alike to scientists and the general public.

(1)

WHEREAS, The price of platinum has risen in the past twenty years from 50 cents or less per gram to as high as \$5.30 in the present year, or in the neighborhood of 1000% increase in cost, making it prohibitive for educational or scientific work; and

WHEREAS, Cheap platinum as it was twenty years ago, would greatly ease and encourage research work in Physics and Chemistry and would doubtless greatly cheapen sulphuric acid, required in making phosphate fertilizers and perhaps quickly give us the key to the utilization of atmospheric nitrogen for use in agriculture as a plant food; and

WHEREAS, The world's stock of platinum is small and the prospects for large additions to this stock are far from bright since the Russian deposits are understood to be approaching exhaustion and we have none as good in sight; and

WHEREAS, The chemical and electrical industries have absolute need for platinum, though they are continually seeking cheaper and as satisfactory substitutes; therefore,

Be it Resolved, That the Ohio Academy of Science commends the effort made in the dental profession and in the electrical industries to find substitutes for platinum in their work and urges all scientists to assist in every way with these important efforts at platinum conservation;

Be it Resolved, That the Ohio Academy of Science urges the dental profession and the electrical and other industries to reduce to a minimum the use of platinum in all places where its ultimate loss is certain;

Be it Resolved, That the Ohio Academy of Science condemns the use of platinum in jewelry and in any other way that is not productive of scientific or industrial advance or development;

Be it Resolved, That the Ohio Academy of Science urges the women of Ohio in the interests of science and the development of industry to abstain from the use of platinum as jewelry.

(2)

WHEREAS, The amount of potash salts is limited and their use in some connections is imperative; and

WHEREAS, Most chemical and other scientific texts and formularies have long been saturated with directions for the use of potash salts where sodium salts would serve as well; and

WHEREAS, There has on this account in the past existed an appalling waste in potash, of which the citation of the use of potassium cyanide in gold metallurgy for years where sodium cyanide would and does do as well may serve as an example; therefore,

Be it Resolved, That the Ohio Academy of Science urges all men of science to eliminate the use of potash where possible, and to publish the results of their experiments or report their experiences, favorable or unfavorable, to the Academy Secretary or to Professor Withrow at the Ohio State University.

Ohio Biological Survey.

An informal report was presented by Professor Herbert Osborn, Director of the Ohio Biological Survey, concerning the recent work of the Survey and its present financial limitations. The following resolution, presented by Professor E. L. Fullmer, was adopted by the Academy.

Resolved, That the Academy record its appreciation of the work of the Ohio Biological Survey and express its sincere hope that the work of the survey may be continued with increased support and activity in order that more rapid progress may be made in the investigation of pressing biological problems. The reports so far published have been of distinct service and furnish a solid basis for further progress while the organization in co-operation with the various universities and colleges gives opportunity for very effective association of the trained biological workers of the state. The authorities of the State University are assured of the continued interest and co-operation of the Academy in any measures which may advance this project.

Preservation of Wild Life of State.

At the suggestion of the Section for Zoology, Professor Herbert Osborn reported on the work of the State Department of Agriculture in providing preserves for the wild life of the State. The Academy expressed its hearty approval and appreciation of this work, and authorized the appointment of a committee to co-operate with the State authorities and to report to the next meeting a policy for the future work of the Academy toward the preservation of the native fauna and flora. The President appointed the Committee as follows: Herbert Osborn, Chairman; J. E. Carman, Bruce Fink, F. H. Herrick, M. M. Metcalf, C. G. Shatzer, E. N. Transeau.

Election of Patron.

On the recommendation of the Executive Committee, Mr. Emerson McMillin was unanimously elected a Patron of the Academy, in recognition of his many financial contributions to the research work of the Academy.

Representation in Council of A. A. A. S.

As an affiliated society, the Academy is entitled to a representative in the Council of the American Association for the Advancement of Science. The Secretary was appointed to serve in this capacity, with power to appoint a substitute in case of inability to attend a meeting of the Council.

Proposed Constitutional Amendment.

Notice was given of a proposed amendment to the constitution, to be submitted for action at the next annual meeting, providing for the nomination of candidates for fellowship in the Academy by two fellows, the election to remain as now provided.

SCIENTIFIC SESSIONS.

The complete scientific program of the meeting follows:

Presidential Address.

"The Einstein Theory of Relativity and Gravitation,"

F. C. BLAKE

Public Lecture.

"Photographing Sound Waves from Large Guns and Projectiles".....DAYTON C. MILLER

Symposium Before Physics Section.

The Constitution of the Atom:

- (a) The Planetary Atom of the Physicist.....S. J. M. ALLEN
- (b) Why Not One Kind of Atom Only?.....R. C. GOWDY
- (c) Discussion, led by.....W. L. EVANS

Papers.

1. Claws of Arachnids.....W. M. BARROWS
2. The Arizona Boll Weevil (*Anthonomus grandis* var. *thurberia*) with Special Reference to Steps Taken by the Arizona Commission of Agriculture and Horticulture to Prevent its Establishment in Cultivated Cotton. Read by title.....DON C. MOTE
3. *Aphelopus theliae* (Gahan) and the Changes Produced in *Thelia* by this Parasite. 15 min. (Lantern).....S. I. KORNHAUSER
4. The Intestinal Parasites of Overseas Troops as Compared with Home Service Troops. 10 min.....S. I. KORNHAUSER
5. A New Disease, Black Tumor, of the Catfish. 5 min.....R. C. OSBURN
6. Classification of the Opalinidæ. 10 min.....MAYNARD M. METCALF
7. Geographical Distribution of the Opalinidæ. 15 min.....MAYNARD M. METCALF
8. Factors in the Distribution of Aquatic Snails in Lake Erie. 20 min. (Lantern).....F. H. KRECKER
9. Caddis-fly Larvæ as Agents in Distribution of Fresh Water Sponges. 5 min. F. H. KRECKER
10. Notes on Some Tropical Homoptera. 8 min.....HERBERT OSBORN
11. Generic and Specific Characters from the Male Genitalia of Syrphidæ (Diptera). 10 min. (Lantern).....C. L. METCALF
12. Some Myriapods of Put-in-Bay. 10 min.....STEPHEN R. WILLIAMS
13. The Chondrocranium of *Syngnathus fuscus*. 20 min.....J. E. KINDRED
14. Additions to the Birds of Ohio. 10 min.....LYNDS JONES
15. Bird Migration Groups. 20 min.....LYNDS JONES
16. Two Recently Destructive Clover Insects of Western Ohio. 5 min.....T. H. PARKS
17. The Preservation of Native Flora and Fauna. 10 min.....HERBERT OSBORN
18. New Economic Applications for the Mangrove. 8 min. (Lantern) H. H. M. BOWMAN
19. The Progress of Revegetation in the Katmai District. 15 min. (Lantern) ROBERT F. GRIGGS

20. Observations on the Edge of the Forest in the Katmai District. 15 min.
(Lantern).....ROBERT F. GRIGGS
21. The Influence of Environment on Sexual Expression in the Hemp. 10 min.
J. H. SCHAFFNER
22. A Double Mutant of the Hemp. 5 min.....J. H. SCHAFFNER
23. Translocation and Storage of Carbohydrates in Apple Fruit Spurs and
Two-year-old Seedlings. 20 min.....SWARNA KUMER MITRA
24. Origin and Character of Schizogenous Resin Cavities in Avocado Fruits
and Leaves. 15 min. (Opaque projection).....SWARNA KUMER MITRA
25. Origin and Character of Adventitious Roots in Cornus Pubescens. 15 min.
(Opaque projection).....SWARNA KUMER MITRA
26. Story of Citrus Fruits of Pinellas County, Florida. 5 min.....
KATHARINE DOORIS SHARP
27. Factors Controlling Transpiration.....JASPER D. SAYRE
28. Certain Conditions that Hinder the Study of Botany in High Schools..
MAXIMILIAN BRAAM
29. Progress in Plant Microchemistry. 20 min.....H. C. SAMPSON
30. Sugar Syrup from Home Grown Sugar Beets. 10 min.....JAMES R. WITHROW
31. Some Farm Experiments in the Making of Syrup from Sugar Beets. 10 min.
F. C. VILBRANDT
32. Some Pertinent Questions for Ohio Scientists. 30 min.
(a) Sulphuric Acid and Kiln Plants and their Fumes.
(b) The Errors of Ohio's Legal Kerosene Flash Point Apparatus—the
Foster Cup.
(c) The Unnecessary Use of Potassium Salts.
(d) The Damage to Science and Industry by the Wastage of Platinum.
JAMES R. WITHROW
33. Partial Solution of Certain Applied Chemical Problems. 30 min.
(a) Saving of Platinum by the Use of Platinum Crucibles in Electro-
analysis.
(b) By a Modified Mercury Cathode Cell.
(c) The Determination of Water in Substances Easily Decomposable
Thermally.
JAMES R. WITHROW
34. Gas Combustion Investigations. 10 min.
(a) Quartz-apparatus.
(b) Central Burner Type.
(c) Devitrification of Quartz in Capillaries.
F. C. VILBRANDT
35. The Thermionic Tube as a Useful Amplifying Tool of the Scientist. 20
min.....A. D. COLE
36. A Seasonal Breakage of Watch Springs and Its Cause. 10 min.....
SAMUEL R. WILLIAMS
37. Springs of Minimum Weight. 20 min.....H. C. LORD
38. Relations between Atomic Numbers and the Wave Lengths of X-rays.
10 min.....S. J. M. ALLEN
39. Relations between Absorption Coefficients and Wave Lengths of X-rays.
10 min.....S. J. M. ALLEN
40. Characteristic Curves of Different Types of Thermionic Tubes. 15 min.
A. D. COLE
41. Thermodynamics. 20 min.....LOUIS T. MORE
42. Electrification by Impact. 10 min.....HAROLD RICHARDS
43. On Self and Mutual Elastance and Capacitance. 15 min.....F. C. BLAKE
44. Note on a Double Solenoid for the Production of Uniform Magnetic Fields.
S. J. BARNETT

45. Observations on Eruptive Phenomena in the Valley of Ten Thousand Smokes. 15 min. (Lantern).....ROBERT F. GRIGGS
46. Diastrophism Still Continuing in the Great Lakes Region. 15 min.....E. L. MOSELEY
47. Clarion and Vanport Members in Ohio. 30 min.....WILBER STOUT
48. A Pre-somite Human Embryo. 10 min. (Opaque projection)...C. L. TURNER
49. Relation of Catalase to Activity. 5 min.....R. J. SEYMOUR
50. Some Features of Industrial Fatigue. 15 min.....E. R. HAYHURST
51. Epidemic Encephalitis. 15 min. (Lantern).....ERNEST SCOTT
52. Measurement of Blood Pressure by Resistance of Carbon Discs.F. P. DURRANT
53. Educative Characteristics of First Grade Children. 15 min...MARY E. MILLER
54. A Study of the Lowest Five Percent of College Students as Determined by the Army Alpha Examinations. 10 min.....HELEN MARSHALL
55. A Study of the Highest Five Percent of College Students as Determined by the Army Alpha Examinations. 10 min.....EARL R. GABLER
56. Experimentation in the Psychology of Music. 15 min...ESTHER L. GATEWOOD
57. Mental and Educational Tests of the Deaf. 10 min.....JEANNETTE REAMER
58. Syphilis and Delinquency. 15 min.....FLORENCE MATEER

Demonstrations.

- (a) Black Tumor of the Catfish.....R. C. OSBURN
- (b) Some Interesting Tropical Hemiptera.....HERBERT OSBORN
- (c) Caddis Cases Covered with Sponges.....F. H. KRECKER
- (d) Wax Models of 8 mm. and 12 mm. Chondrocrania of Syngnathus.....J. E. KINDRED
- (e) Models of Pre-somite (Mateer) Human Embryo.....C. L. TURNER
- (f) Specimens from the Valley of Ten Thousand Smokes....ROBERT F. GRIGGS
- (g) Wireless Telephone.....R. A. BROWN

CONSTITUTION

Adopted November 28, 1908.

Reprinted, with Amendments, 1920.

ARTICLE I—NAME.

This Society shall be known as the Ohio Academy of Science.

ARTICLE II—OBJECTS.

The objects of this Academy shall be the promotion of scientific research and the diffusion of knowledge concerning the various departments of science.

ARTICLE III—MEMBERSHIP.

1. *Classes of Members.* The Academy shall be composed of resident members, corresponding members, fellows honorary members, and patrons.

2. *Resident Members.* Resident members shall be persons interested in scientific work and resident in the State of Ohio.

3. *Corresponding Members.* Corresponding members shall be persons interested in science and not resident in the State of Ohio.

4. *Fellows.* Fellows shall be persons who are engaged in productive scientific work.

5. *Honorary Members.* Honorary members shall be persons distinguished for their attainments in science and not resident of the State of Ohio. Their number shall not exceed twenty-five.

6. *Patrons.* Patrons shall be persons who have bestowed important favors upon the Academy as defined in the By-Laws.

7. *Privileges of Members.* Only resident members, fellows, and patrons shall be entitled to vote in the Academy; only fellows and patrons shall be eligible to office and to membership in the Executive Committee.

ARTICLE IV—OFFICERS, COMMITTEES, ETC.

1. *Officers.* The officers of the Academy shall be a President, a Vice-President of each section organized, a Secretary, and a Treasurer.

2. *Executive Committee.* The President, Secretary, and Treasurer, together with two elective members, shall constitute an Executive Committee.

3. *Publication Committee.* The Publication Committee shall consist of three elective members.

4. *Program Committee.* The Program Committee shall consist of the Secretary and the Vice-Presidents of the various Sections.

5. *Trustees of Research Fund.* Three trustees elected in accordance with Section 16 shall be designated as Trustees of the Research Fund.

6. *Library Committee.* The Library Committee shall consist of three members elected in accordance with the provisions of Section 16.

7. *President.* The President shall discharge the usual duties of a presiding officer at all meetings of the Academy and of the Executive Committee. He shall take cognizance of the acts of the Academy and of its officers, and cause the provisions of the Constitution and By-Laws to be faithfully carried into effect. He shall also give an address to the Academy at the annual meeting of the year for which he is elected.

8. *Absence of President.* The duties of the President in case of his absence or disability shall be assumed by one of the Vice-Presidents designated by the Executive Committee.

9. *Vice-Presidents.* The Vice-Presidents shall be chairmen of their respective Sections. They shall further, with the Secretary acting as chairman, constitute a Program Committee to arrange for the presentation of papers at the annual meeting.

10. *Secretary.* The Secretary shall keep the records of the proceedings of the Academy and a complete list of the members with the dates of their election and disconnection with the Academy. He shall co-operate with the President in attending to the ordinary affairs of the Society and also attend to the preparation, printing and mailing of circulars, blanks and notifications of elections and meetings. The Secretary shall superintend printing ordered by the Executive Committee, which is not within the province of the Publication Committee, and shall have charge of its distribution under direction of the Executive Committee. The Secretary shall also be chairman of the Program Committee as constituted in Section 4.

11. *Treasurer.* The Treasurer shall have the custody of all funds of the Academy. He shall keep an account of receipts and disbursements in detail, and this account shall be audited as hereinafter provided.

12. *Duties of Executive Committee.* The Executive Committee is clothed with executive authority and with legislative powers of the Academy in the intervals between the regular annual meetings. No extraordinary act of the committee shall, however, remain in force beyond the next annual meeting unless ratified by the Academy. The Executive Committee shall receive nominations for membership and on approval shall submit such nominations to the Academy for action. It shall have the power to fill vacancies *ad interim* in any of the offices of the Academy.

13. *Duties of Publication Committee.* The Publication Committee shall have charge of the preparation and publication of the Annual Report and of such other papers as may be considered by them desirable to have printed.

14. *Duties of Trustees of Research Fund.* The Trustees of the Research Fund shall be three in number. They shall have charge of the allotment and distribution of the income or of the principal of the Research Fund.

15. *Duties of Library Committee.* The Library Committee shall advise with the Librarians of The Ohio State University on all questions arising in connection with the management of the Library of the Ohio Academy of Science, deposited with the Ohio State University Library, and in connection with the distribution of the publications of the Academy.

16. *Terms of Office.* The President, Vice-Presidents, Secretary, Treasurer, and elective members of the Executive Committee and Publication Committee, shall be elected annually at the annual meeting, and shall be eligible to re-election without limitation, with the exception of the President, who shall not be elected for successive terms. The Trustees of the Research Fund and the members of the Library Committee shall be elected for a term of three years, one trustee and one member of the Library Committee being elected each year.

ARTICLE V—VOTING AND ELECTIONS.

1. *Nomination of Members.* (a) Nominations for resident membership shall be made by two resident members in accordance with a form provided by the Executive Committee. One of such resident members must be acquainted with the nominee and his qualifications for mem-

bership. The nominations shall be considered by the Executive Committee and if approved by each of its members, shall be submitted to a vote of the Academy at any annual or special meeting.

(b) Nominations for corresponding members, honorary members, and patrons, shall be made by the Executive Committee of the Academy, the elections to take place as in the case of resident members.

2. *Election of Members, etc.* All elections shall be by ballot. To elect a Resident Member, Corresponding Member, Honorary Member, or Patron, shall require the assent of three-fourths of all Resident Members voting.

*3. *Election of Fellows.* Fellows shall be elected by joint action of the Executive Committee and the Vice-Presidents; approval by three-fourths of this joint committee shall be necessary to election.

4. *Expulsion.* Any member may be expelled by a vote of nine-tenths of all members present at any annual meeting, provided notice that such a movement is contemplated be given to members at least three months previous to such action.

5. *Election of Officers.* Nominations for office shall be made by a nominating committee as provided in the By-Laws. The nominations shall be submitted to a vote of the Academy at its regular annual meeting. The officers thus elected shall enter upon their duties at the adjournment of the meeting.

ARTICLE VI—MEETINGS.

1. *Annual Meeting.* The Annual Meeting shall be held during March or April, the place and exact date being determined by the Executive Committee and announced by circular at least thirty days before the meeting. The details of the daily session of each meeting shall be arranged by the Executive Committee and announced in the official program immediately before the meeting.

2. *Field Meeting.* A field meeting may be called at the option of the Executive Committee.

3. *Special Meeting.* A special meeting of the Academy may be called by the Executive Committee upon the written request of twenty resident members.

4. *Quorum.* Fifteen resident members shall constitute a quorum for the transaction of business.

*A proposed amendment, to be submitted for action at the Annual Meeting for 1921, calls for the nomination of candidates for fellowship by two fellows of the Academy, other details of election to remain unchanged.

ARTICLE VII—SECTIONS.

1. *Formation of Sections.* Members not less than fifteen in number may by special permission of the Academy unite to form a section for the investigation of any branch of science. Each section shall bear the name of the science which it represents, thus: The Section of Geology of The Ohio Academy of Science.

2. *Privileges of Sections.* Each section is empowered to perform its own organization as limited by the Constitution and By-Laws of the Academy.

ARTICLE VIII—AMENDMENTS.

1. This Constitution may be amended at any annual meeting by a three-fourths vote of all resident members voting, provided that the substance of the amendment shall have been submitted at a preceding Annual Meeting.

BY-LAWS

CHAPTER I—MEMBERSHIP.

1. *Dues.* No person shall be accepted as a resident member or as a corresponding member unless dues for the year are paid within three months after notification of election. The annual dues shall be two dollars, payable in advance. A single payment of twenty-five dollars, however, shall be accepted as commutation for life.

2. *Investment of Commuted Dues.* The sums paid in commutation of dues shall be invested, and the interest used for the ordinary purposes of the Academy during the payer's life, but after his death the sum shall be converted into the Research Fund.

3. *Non-payment of Dues.* Non-payment of annual dues shall deprive a resident member of taking part in the management and receiving the publication of the Academy. An arrearage continuing over two years shall be construed as notification of withdrawal. The Secretary and Treasurer shall be exempt from the payment of dues during the year in which they hold office.

4. *Patrons.* Any person eligible under Article III of the Constitution may be elected a Patron of the Academy upon payment of one hundred dollars to the Research Fund of the Society.

CHAPTER II—OFFICIALS.

1. *Authorization of Accounts.* The President and the Treasurer shall countersign, if they approve, all duly authorized accounts and orders drawn for the disbursement of money.

2. *Duties of Treasurer.* The Treasurer shall give bonds with two good sureties approved by the Executive Committee in the sum of five hundred dollars, for the performance of his duties and the safe keeping of the funds of the Academy. He may at his discretion deposit the funds in a bank, but shall not invest them without the authority of the Executive Committee. His accounts shall be balanced on the first day of the Annual Meeting of each year.

CHAPTER III—ELECTION OF MEMBERS.

1. *Nomination of Resident Members.* Nominations for resident members may be proposed at any time on blanks to be supplied by the Secretary.

2. *Form of Nomination.* The form for the nomination shall be as follows:

Ohio Academy of Science.

.....19.....

To the Committee on Membership:

I desire to become a member of the Ohio Academy of Science.

Name

Address

Branches of Science in which Interested

Countersigned by Members:

.....
.....

3. *Election of Resident Members.* This form when filled is to be transmitted to the Secretary who shall bring all nominations before the Executive Committee at either the annual, special, or field meetings of the Academy; and the Executive Committee shall signify its approval or disapproval of each. The list of candidates approved shall then be presented to the Academy for election.

4. *Patrons, etc.* Patrons, honorary members, and corresponding members shall be nominated by the Executive Committee and shall be elected in the same manner as resident members.

CHAPTER IV—ELECTION OF OFFICERS.

1. *Election of Officers.* At the Annual Meeting the election of officers shall take place and the officers elected shall enter on their duties at the end of the meeting.

2. *Nominations.* The Academy shall select by ballot a Nominating Committee consisting of three members, who shall nominate a candidate for each office, including elective members of the Executive Committee, the Publication Committee, and the Trustees of the Research Fund. Additional nominations may be made by any member of the Academy.

CHAPTER V—FINANCIAL METHODS.

1. *Authorization of Expenditures.* No pecuniary obligation shall be contracted without express sanction of the Academy or the Executive Committee. It is understood, however, that all ordinary expenses in connection with the meetings have the permanent sanction of the Academy without special action.

2. *Bills and Vouchers.* Every creditor of the Academy must present to the Treasurer an *itemized* bill certified by the official ordering it, and approved by the President. The Treasurer may then approve and pay the amount out of any funds not otherwise appropriated, and the receipted bill shall be held as his voucher.

3. *Audit.* At each annual meeting the President shall call upon the Academy to choose two members who are not officers of the Society, to whom shall be referred the books of the Treasurer duly posted and balanced to the first day of the Annual Meeting as specified in Chap. II, Sec. 2, of the By-Laws. These Auditors shall examine the accounts and vouchers of the Treasurer and before the adjournment of the meeting shall render a report, and the Academy shall take appropriate action.

CHAPTER VI—PUBLICATIONS.

1. *Publication Committee.* The publications of the Academy are in charge of the Publication Committee.

2. *Distribution.* One copy of each publication shall be sent to every resident member, corresponding member, fellow, honorary member, and patron, while each author shall receive thirty copies of his memoir. This provision shall not be understood as including publications in journals not controlled by the Academy.

3. *Official Organ.* The official organ of the Academy is the "Ohio Journal of Science" under the following terms of agreement:

(a) The Academy shall pay to the "Ohio Journal of Science" one dollar for each subscription sent to members not in arrears for payment of dues.

(b) The "Ohio Journal of Science" shall publish announcements of meetings, lists of publications for sale, etc., whenever the Academy desires. Such matter, however, may be restricted to one-half page of advertising space in any one issue.

(c) The "Ohio Journal of Science" will print papers of from 300 to 1,500 words presented at the annual meeting provided such papers are submitted in typewritten form within two weeks from the time of adjournment of the meeting, and have been passed upon favorably by the Publication Committee and by the Editor of the "Journal."

4. *Annual Report.* The Annual Report of the Academy, including list of officers, list of members, presidential address, and such other matter as the publication committee may determine shall be printed as a separate issue by the publication committee.

5. *Special Papers.* Papers exceeding 1,500 words may be published at the discretion of the publication committee as a part of the series of Special Papers.

6. *Proceedings.* The publication committee shall assemble the Annual Reports and the Special Papers into volumes of proceedings of convenient size, paged consecutively in each volume, under the general title "Proceedings of the Ohio Academy of Science."

CHAPTER VII—RESEARCH FUND.

1. *Sources of Fund.* The Research Fund shall consist of moneys paid by the general public for publications of the Academy, of donations made in the aid of research, and of sums paid in commutation of dues according to By-Laws, Chapter I, Paragraph 1.

2. *Donors.* Donors to this fund, to the sum of twenty-five dollars or more, shall be entitled without charge, to publications subsequently appearing.

3. *Endowment.* The aim of the Academy shall be to accumulate a fund of which the income alone shall be used for the encouragement of research and for the publication of papers bearing upon the development of science in the state.

CHAPTER VIII—ORDER OF BUSINESS.

1. *Annual Meeting.* The order of business at the Annual Meeting shall be as follows:

1. Opening.
 - a. Call to order by the Presiding Officer.
 - b. Statements by the President.
 - c. Appointment by the chair of a committee of three on membership. To secure nominations of new members.
 - d. Appointment by the chair of a committee of three on resolutions.
2. Reports of officers.
 - a. Secretary.
 - b. Treasurer.
3. Appointment by the Academy of an Auditing Committee of two members.
4. Reports of Standing Committees.
 - a. Executive Committee.
 - b. Publication Committee.
 - c. Program Committee.
 - d. Trustees of Research Fund.
 - e. Library Committee.
5. Reports of Special Committees.
6. New Business.
7. Election of Nominating Committee.
8. Report of Nominating Committee and Election of Officers.
9. Election of Members.
10. Report of Committee on Resolutions.
11. Report of Auditing Committee.
12. Unfinished Business.
13. Adjournment.

2. *Annual Meeting, Special Rules.* Items of business under 1 to 7 shall be taken up at the first business meeting where possible and be followed by reading of papers. At an adjourned session the order shall be resumed at the place reached on the previous adjournment, but new announcements, motions, and resolutions, shall be in order before the resumption of the business pending.

3. *Special or Field Meeting.* At a special meeting or a field meeting items of business under 2, 3, 4, except "a," 7, 8, 11 shall be omitted.

4. *Special or Field Meeting, Special Business.* At any special meeting or field meeting the order of business shall be 1, followed by the special business for which the meeting was called, and this in turn followed by 9, 12, 13, when advisable.

CHAPTER IX—AMENDMENTS.

These By-Laws may be amended by a majority of those voting at any annual meeting.

PROCEEDINGS
OF THE
OHIO
ACADEMY OF SCIENCE

AFFILIATED WITH THE
AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE

VOLUME VII, PART SIX

Annual Report
Thirty-First Meeting

ANNUAL REPORT
OF THE
OHIO ACADEMY OF SCIENCE

Thirty-First Meeting

1921

Organized 1891

Incorporated 1892

Affiliated with the American Association for the Advancement of Science

PUBLICATION COMMITTEE

J. H. SCHAFFNER

L. B. WALTON

L. G. WESTGATE

Date of Publication, January 10, 1922

Published by the Academy
Columbus, Ohio

OFFICERS, 1921-1922

President

R. C. OSBURN

Vice-Presidents

J. E. KINDRED

E. N. TRANSEAU

J. E. HYDE

W. G. HORMELL

F. C. WAITE

G. F. ARPS

Secretary

E. L. RICE

Treasurer

A. E. WALLER

Executive Committee

Ex-Officio

R. C. OSBURN

A. E. WALLER

E. L. RICE

Elective

W. H. ALEXANDER

L. B. WALTON

Board of Trustees

T. C. MENDENHALL, *Chairman*, term expires.....1924

HERBERT OSBORN, term expires.....1923

G. D. HUBBARD, term expires.....1922

Publication Committee

J. H. SCHAFFNER, *Chairman*, term expires.....1922

L. B. WALTON, term expires.....1923

L. G. WESTGATE, term expires.....1924

Library Committee

W. C. MILLS, *Chairman*, term expires.....1924

F. O. GROVER, term expires.....1923

C. W. REEDER, term expires.....1922

PAST OFFICERS

Presidents

1892.	E. W. CLAYPOLE	1907.	CHARLES DURY
1893.	EDWARD ORTON	1908.	FRANK CARNEY
1894.	F. M. WEBSTER	1909.	J. H. SCHAFFNER
1895.	D. S. KELLICOTT	1910.	W. F. MERCER
1896.	A. A. WRIGHT	1911.	L. G. WESTGATE.
1897.	W. A. KELLERMAN	1912.	BRUCE FINK
1898.	W. G. TIGHT	1913.	L. B. WALTON
1899.	G. F. WRIGHT	1914.	T. C. MENDENHALL
1900.	JOSUA LINDAHL	1915.	J. WARREN SMITH
1901.	A. D. SELBY	1916.	G. D. HUBBARD
1902.	W. R. LAZENBY	1917.	F. O. GROVER
1903.	C. J. HERRICK	1918.	F. L. LANDACRE
1904.	E. L. MOSELEY	1919.	M. M. METCALF
1905.	HERBERT OSBORN	1920.	F. C. BLAKE
1906.	E. L. RICE	1921.	W. H. ALEXANDER

Vice-Presidents

1892.	A. A. WRIGHT, ELLEN E. SMITH
1893.	D. S. KELLICOTT, D. L. JAMES
1894.	G. H. COLTON, MRS. W. A. KELLERMAN
1895.	H. E. CHAPIN, JANE F. WINN
1896.	A. L. TREADWELL, CHARLES DURY
1897.	C. E. SLOCUM, J. B. WRIGHT
1898.	JOSUA LINDAHL, J. H. TODD
1899.	CHAS. E. ALBRIGHT, A. D. SELBY
1900.	J. A. BOWNOCKER, LYNDY JONES
1901.	H. HERZER, MRS. W. A. KELLERMAN
1902.	C. J. HERRICK, C. S. PROSSER
1903.	J. A. BOWNOCKER, MISS L. C. RIDDLE
1904.	LYNDY JONES, L. H. MCFADDEN
1905.	C. W. DABNEY, F. M. COMSTOCK
1906.	CHARLES DURY, LYNDY JONES
1907.	W. F. MERCER, FRANK CARNEY
1908.	J. H. SCHAFFNER, F. C. WAITE
1909.	L. G. WESTGATE, S. R. WILLIAMS
1910.	M. M. METCALF, BRUCE FINK, G. D. HUBBARD
1911.	CHAS. BROOKOVER, M. E. STICKNEY, G. D. HUBBARD
1912.	M. M. METCALF, M. E. STICKNEY, N. M. FENNEMAN
1913.	F. C. WAITE (vice CHARLES BROOKOVER), F. O. GROVER, AUGUST FOERSTE, T. C. MENDENHALL
1914.	STEPHEN R. WILLIAMS, E. L. FULLMER, N. M. FENNEMAN, A. D. COLE

Vice-Presidents

1915. F. C. WAITE, F. O. GROVER, C. G. SHATZER, J. A. CULLER
 1916. F. L. LANDACRE, M. E. STICKNEY, T. M. HILLS, L. T. MORE
 1917. STEPHEN R. WILLIAMS, E. L. FULLMER, AUGUST FOERSTE,
 M. E. GRABER
 1918. C. G. SHATZER, FRED A. DETMERS, G. F. LAMB, SAMUEL R.
 WILLIAMS, R. J. SEYMOUR
 1919. R. A. BUDINGTON, C. E. O'NEAL, G. F. LAMB, S. J. M. ALLEN,
 ERNEST SCOTT
 1920. F. H. HERRICK, A. B. PLOWMAN, J. E. HYDE, J. A. CULLER,
 R. J. SEYMOUR, G. R. WELLS
 1921. F. H. KRECKER, C. H. OTIS, W. H. BUCKER, D. C. MILLER,
 ERNEST SCOTT, J. W. BRIDGES

Treasurers

- | | | | |
|----------|----------------|----------|--------------|
| 1892-95. | A. D. SELBY | 1905-19. | JAS. S. HINE |
| 1896-98. | D. S. KELICOTT | 1919. | W. J. KOSTIR |
| 1899-04. | HERBERT OSBORN | 1919- | A. E. WALLER |

Librarian

- 1904-15. W. C. MILLS

Secretaries

- | | | | |
|----------|---------------|----------|----------------|
| 1892. | W. R. LAZENBY | 1904. | F. L. LANDACRE |
| 1893-94. | W. G. TIGHT | 1905-12. | L. B. WALTON |
| 1895-03. | E. L. MOSELEY | 1913- | E. L. RICE |

Trustees

- | | | | |
|----------|-----------------|----------|------------------|
| 1900-04. | F. M. WEBSTER | 1910-13. | FRANK CARNEY |
| 1900-02. | H. C. BEARDSLEE | 1913-17. | M. M. METCALF |
| 1904-06. | C. J. HERRICK | 1914-17. | N. M. FENNEMAN |
| 1900-05. | J. H. SCHAFFNER | 1916- | T. C. MENDENHALL |
| 1901-16. | W. R. LAZENBY | 1917- | HERBERT OSBORN |
| 1905-08. | G. B. HALSTEAD | 1917-19. | M. E. STICKNEY |
| 1907-08. | CHAS. DURY | 1919- | G. D. HUBBARD |
| 1908-14. | E. L. RICE | | |

Publication Committee

- | | | | |
|----------|-----------------|----------|-----------------|
| 1892-01. | F. M. WEBSTER | 1906-12. | J. C. HAMBLETON |
| 1892-97. | W. A. KELLERMAN | 1908-11. | BRUCE FINK |
| 1892-96. | E. W. CLAYPOLE | 1911-14. | C. G. SHATZER |
| 1897-99. | E. L. MOSELEY | 1912-18. | J. H. SCHAFFNER |
| 1898-00. | S. BELLE CRAVER | 1913-16. | C. H. LAKE |
| 1900-08. | J. H. SCHAFFNER | 1914- | L. B. WALTON |
| 1901-03. | L. H. MCFADDEN | 1916-19. | J. A. CULLER |
| 1902-04. | GERARD FOWKE | 1918- | L. G. WESTGATE |
| 1904-05. | JAS. S. HINE | 1919- | J. H. SCHAFFNER |
| 1905-13. | E. L. RICE | | |

Library Committee

1916- W. C. MILLS
 1916-17. J. A. CULLER

1916- F. O. GROVER
 1917- C. W. REEDER

Places of Annual Meetings

1891. Columbus
 1892. Columbus
 1893. Columbus
 1894. Columbus
 1895. Cincinnati
 1896. Columbus
 1897. Columbus
 1898. Columbus
 1899. Cleveland
 1900. Columbus
 1901. Columbus
 1902. Columbus
 1903. Granville
 1904. Cleveland
 1905. Cincinnati

1906. Columbus
 1907. Oxford
 1908. Granville
 1909. Delaware
 1910. Akron
 1911. Columbus
 1912. Columbus
 1913. Oberlin
 1914. Columbus
 1915. Columbus
 1916. Columbus
 1917. Columbus
 1918. Columbus
 1919. Columbus
 1920. Columbus

1921. Cleveland

MEMBERSHIP

December 1, 1921

Date of admission to the Academy shown by numerals preceding names. Members marked as admitted in 1891 are Charter Members. A second date, in parentheses after name, indicates date of re-admission after an interruption of membership.

An asterisk, in parentheses after the name, indicates an *ad interim* election by the Executive Committee subject to the ratification of the Academy at the next Annual Meeting.

Fellowship in the Academy is indicated by the letter F. in parentheses after the name. Numerals following letter indicate date of election to fellowship.

Names of National Members (*i. e.*, members of the Academy who are also members of the American Association for the Advancement of Science) are printed in Capital Letters.

LIFE MEMBER AND PATRON

- '92. McMILLIN, EMERSON (F '20).....Darlington Farms, Ramsey, N. J.

ACTIVE MEMBERS

- '98. AIKEN, W. H., *Botany*.....Station K, Cincinnati
 '19. AIKINS, H. AUSTIN (F '20), *Psychology*. Western Reserve Univ., Cleveland
 '21. AINSLEE, GEO. G., *Entomology*.....
 U. S. Entomological Laboratory, R. D. 9, Knoxville, Tenn.
 '91. ALBRIGHT, CHARLES E.176 Webster Park Ave., Sta. B, Columbus
 '15. ALBYN, HERBERT A., *Entomology, Ornithology, Archeology*, Toboso, Licking Co.
 '19. ALEXANDER, WILLIAM H. (F '20), *Meteorology*...Weather Bureau, Columbus
 '12. ALLEN, S. J. M. (F '20), *Physics*.....Univ. of Cincinnati, Cincinnati
 '21. ALTAFFER, L. B., *Chemistry*.....7013 Clinton Ave., Cleveland
 '20. ANDERSON, DONALD B., *Botany*.....
 Botany and Zoology Building, O. S. U., Columbus
 '20. ARPS, G. F. (F '21), *Psychology*.....216 E. Lane Ave., Columbus
 '12. ATKINSON, A. A., (F '20), *Physics and Allied Subjects*...Ohio Univ., Athens
 '20. BALDUF, WALTER V., *Zoology*.....
 Dept. of Zoology and Entomology, O. S. U., Columbus
 '07. BALES, B. R., *Ornithology, Entomology*.....149 W. Main St., Circleville
 '04. BALL, E. D. (F '20), *Entomology*...U. S. Dept. of Agric., Washington, D. C.
 '19. BALLIN, E., *Chemistry*.....320 Burns Ave., Wyoming
 '13. BARNETT, S. J., (F '20), *Physics*.....
 Dept. of Terrestrial Magnetism, Carnegie Institute, Washington, D. C.
 '09. BARROWS, WILLIAM M. (F '20), *Experimental Zoology*, O. S. U., Columbus
 '15. BAUMILLER, G. N., *Geology, Chemistry, Zoology*.....
 8415 Carnegie Ave., Cleveland

- '21. BEAN, RAYMOND JACKSON, *Physiology, Embryology*.....
Biological Laboratory, Western Reserve University, Cleveland
- '94. BEARDSLEE, HENRY C., ('20), *Botany*.....Perry
- '05. BENEDICT, H. M. (F '20), *Botany*.....Univ. of Cincinnati, Cincinnati
- '09. BERGER, E. W., *Zoology*.....Gainesville, Florida
- '20. BERGER, F. L., *Physics*.....121 E. Long St., Ada
- '12. BEVAN, ARTHUR (F '20), *Geology*, Univ. of Montana, Missoula, Mont.
- '19. BIRCH, T. BRUCE, *Psychology*.....1115 N. Fountain Ave., Springfield
- '12. BLAKE, FREDERICK C. (F '20), *Physics*.....O. S. U., Columbus
- '91. BLEILE, ALBERT M. ('13; F '20), *Physiology, Biology*, O. S. U., Columbus
- '19. BLISS, CHESTER I., *Entomology, Psychology, General Biology, Museum Technique*.....Dept. of Zoology, Columbia Univ., New York City
- '20. BOHL, RAY ANDERSON, *Anatomy, Zoology*.....838 May St., Akron
- '20. BOWMAN, H. H. M., (F '21), *Botany, Zoology*.....
University Science Hall, Cherry and Page Sts., Toledo
- '96. BOWNOCKER, JOHN A. (F '20), *Geology*.....O. S. U., Columbus
- '05. BRAAM, MAXIMILIAN, *Zoology, Botany*, Hughes High School, Cincinnati
- '09. BRAUN, ANNETTE F., *Zoology*.....2702 May St., Cincinnati
- '20. BRAUN, E. LUCY (F '21), *Botany*.....2702 May St., Cincinnati
- '19. BREITENBECHER, J. K., *Zoology*.....Western Reserve Univ., Cleveland
- '19. BRIDGES, JAMES W. (F '20), *Psychology*.....
University of Toronto, Toronto, Ontario
- '05. BROOKOVER, CHARLES (F '20), *Zoology*.....
Medical Dept., Univ. of Louisville, Louisville, Ky.
- '01. BRUGGER, HARVEY, *Botany*.....1415 Buckland Ave., Fremont
- '11. BRYANT, E. R., *Biology*.....New Concord
- '99. †BUBNA, MATTHIAS, *Entomology*.....2629 Woodhill Road, Cleveland
- '13. BUCHER, WALTER H. (F '20), *Geology, Physics*.....
Dept. of Geology, Univ. of Cincinnati, Cincinnati
- '08. BUDINGTON, R. A. (F '20), *Zoology, Physiology*...Oberlin College, Oberlin
- '00. BURGESS, A. F., *Entomology*.....Melrose Highlands, Mass.
- '14. BURTON, DOROTHY WALTERS (MRS. E. RAY), *Zoology*.....
Dept. of Anatomy, O. S. U., Columbus
- '20. BURTT, HAROLD E. (F '21), *Psychology*.....
Dept. of Psychology, O. S. U., Columbus
- '15. CALDWELL, F. C. (F '20), *Electricity, Light*.....O. S. U., Columbus
- '17. CAMERON, HAZEL C., *Pathology*.....710 N. Park St., Columbus
- '19. CAMPBELL, EVA GALBREATH, *Biology*.....
N. C. College for Women, Greensboro, N. C.
- '15. CARMAN, J. ERNEST (F '20), *Geology*.....O. S. U., Columbus
- '05. CARNEY, FRANK (F '20), *Geology*, 208 S. Chautauqua Ave., Wichita, Kan.
- '21. CHASE, SAMUEL WOOD, *Zoology*.....1353 E. Ninth St., Cleveland
- '21. CHASSELL, LAURA M., *Psychology*...Dept. of Psychology, O. S. U., Columbus
- '19. CHURCHILL, D. C. (F '20), *Physics*.....Oberlin
- '91. CLAASSEN, EDO (F '20), *Botany*.....13712 Fernwood Ave., East Cleveland
- '20. CLAYTON, E. E., *Botany*.....Botany Bldg., O. S. U., Columbus

- '05. CLEVINGER, J. F., *Botany*.....3927 Fifth St., N. W., Washington, D. C.
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- '21. WILLIAMS, R. D., *Philosophy, Psychology*.....
Dept. of Philosophy, O. S. U., Columbus
- '13. WILLIAMS, SAMUEL R. (F '20), *Physics*.....154 Forest St., Oberlin
- '03. WILLIAMS, STEPHEN R. (F '20), *Biology*.....300 E. Church St., Oxford
- '97. WILLIAMSON, E. B., *Entomology*.....Bluffton, Ind.
- '15. WITHROW, JAMES R. (F '20), *Chemistry, Mineralogy*..O. S. U., Columbus
- '92. †WRIGHT, G. FREDERICK (F '20), *Geology*.....Oberlin
- '20. WURDACK, MARY E., *Botany*.....29 Twelfth Ave., Columbus
- '15. WYKOFF, HARRY S., *Biology, Botany*.....2234 Shunk Ave., Alliance
- '17. YAMPOLSKY, CECIL, *Botany, Zoology, Genetics*.....
Madan, Sumatra, Dutch East Indies
- '03. YORK, HARLAN H., *Botany*...West Virginia Univ., Morgantown, W. Va.
- '21. YOUNG, HERMAN H., *Psychology, Educational Research*.....
235 Chapel Place, Youngstown
- '06. YOUNG, R. A., *Botany*.....120 Chestnut Ave., Takoma Park, D. C.

Total Membership—325

† Deceased April 20, 1921.

REPORT

OF THE

THIRTY-FIRST ANNUAL MEETING

OF

The Ohio Academy of Science

The Thirty-first Annual Meeting of the Ohio Academy of Science was held at Western Reserve University and Case School of Applied Science, Cleveland, Ohio, March 25 and 26, 1921, under the Presidency of Mr. W. H. Alexander. Fifty-nine members were registered as in attendance; forty-seven new members were elected.

In accordance with the practice begun in 1918, but of which discontinuance has since been threatened, a geological excursion was organized by Professor J. E. Hyde, Vice-President for Geology, 1921-22, for the three days, May 28, 29 and 30. The party was under the guidance of Drs. August Foerste and W. H. Shideler. The itinerary (Wilmington, Clarksville, Fort Ancient, Oregonia, Dayton) was planned for the study of the Richmond formations of southwestern Ohio. Like other Academy functions, the excursion was open to non-members as well as members; fifteen geologists were present.

GENERAL PROGRAM.

FRIDAY, MARCH 25.

- 9:30 A. M.—Business Meeting.
- 11:00 A. M.—Reading of Papers in General Session.
- 12:30 P. M.—Luncheon.
- 2:00 P. M.—Demonstrations.
- 2:30 P. M.—Reading of Papers in General Session.
- 3:30 P. M.—Lecture by Dr. Henry H. Goddard, Bureau of Juvenile Research, Columbus, on "Scientific Work at the Bureau of Juvenile Research."
- 4:30 P. M.—Reading of Papers in General Session.
- 6:30 P. M.—Dinner.

- 8:00 P. M.—Address by the President of the Academy, Mr. W. H. Alexander, U. S. Weather Bureau, Columbus, on "Thunder Storms: Especially Those of Ohio."
- 9:00 P. M.—Adjourned Business Meeting.

SATURDAY, MARCH 26.

- 9:00 A. M.—Adjourned Business Meeting.
- 10:00 A. M.—Lecture by Professor Charles A. Kofoid, University of California, Berkeley, California, on "Hookworm and Human Efficiency."
- 11:00 A. M.—Reading of Papers in Sectional Meetings.
- 2:00 P. M.—Demonstrations.

SATURDAY, MAY 28—MONDAY, MAY 30.

Excursion by Section for Geology.

MINUTES OF BUSINESS MEETINGS.

The first business session was called to order by President Alexander at 9:30 A. M., on Friday, March 25. Adjourned sessions were held after the presidential address on Friday evening and at 9:00 A. M. on the following day.

The appointment of the following committees for the meeting was announced by the chair:

Committee on Membership—F. C. Waite, E. L. Fullmer, J. E. Hyde.

Committee on Resolutions—C. G. Shatzer, R. C. Osburn, W. H. Bucher.

Committee on Necrology—J. E. Hyde.

The following Auditing Committee was elected by the Academy: L. B. Walton, E. L. Fullmer.

The following Nominating Committee was elected by the ballot of the Academy: F. H. Herrick, E. L. Fullmer, J. E. Carman, F. C. Waite, H. H. Young.

Report of the Secretary.

The following report by the Secretary was received and ordered filed:

March 22, 1921.

To the Ohio Academy of Science:

Much of the work of the Secretary is covered by the Report of the Executive Committee.

The following brief note from Mr. McMillin, in reply to the Secretary's notification of election as patron and fellow, will be of interest to the membership of the Academy and may well have a permanent place in the records of the Academy:

DARLINGTON, MAHWAH, N. J., July 3, 1920.

DEAR MR. RICE:

Your good letter of July 1st was received a few moments ago. I thank the Society for all the honors they have conferred upon me, and greedily accept them all.

Most sincerely yours,

EMERSON McMILLIN.

Edward L. Rice, Sec'y, Ohio Academy of Science.

There has been some additional correspondence with the National Research Council concerning the research work of the Academy.

An appeal for the students of the Department of Geography of the Hungarian University of Debreczen was received under date of December 7, and will be presented later in the meeting.

A brief report of the Thirtieth Annual Meeting was prepared for *Science*, and appeared in the issue for August 6th.

In accordance with the instructions of the Academy, the Secretary prepared the Constitution, as amended to date, for reprinting, and it appeared in the Proceedings in connection with the Report of the Annual Meeting.

A number of technical changes in the form of the membership list were necessitated by the designation of fellows and national members (i. e., Academy members who are also members of the American Association for the Advancement of Science). In this revision errors may well have crept in; the secretary will be very grateful for corrections of such mistakes in order that the next list may be made as accurate as possible.

Respectfully submitted,

EDWARD L. RICE, *Secretary*.

Report of the Treasurer for the Year 1920-'21.

The report of the Treasurer was received as follows, and referred to the Auditing Committee, whose report is appended.

Balance in Hayden-Clinton Bank, May 13, 1920, as previously reported.....	\$ 363.90
Deposits.....	1,357.90
Total.....	\$1,721.80
Less checks.....	1,206.06
Balance in bank March 17, 1921.....	\$515.74

The distribution of the funds expended is as follows:

To members of the Ohio Academy as refunds from the A. A. S.		\$ 46.00
To E. L. Rice, Secretarial expenses.		12.51
To Independent Print Shop.		53.25
To Spahr & Glenn, Printers.		8.75
To Hiss Stamp Company.		1.40
To James S. Hine for Ohio Journal of Science.		500.00
To T. C. Mendenhall, for coupons from bond.		4.15
To B. E. Livingston for A. A. A. S.		580.00
		\$1,206.06
<i>Cr.</i>		
Balance carried forward.		\$ 363.90
Cash deposited.		1,357.90
		\$1,721.80
<i>Dr.</i>		
As itemized expenditures.		\$1,206.06
Balance in hand.		515.74
		\$1,721.80

The Treasurer feels that the Academy is on a sound financial basis as is indicated in the report. He wishes to take this occasion to thank the members of the Ohio Academy of Science for their cordial support. There have been several cases of delays and misunderstandings in the collection of the joint dues for the American Association for the Advancement of Science and for the Academy. This is greatly to be regretted but from a careful study of the methods of payment, the Treasurer believes that the system will be practically automatic in another year. In order to avoid all trouble and inconvenience, prompt payments should be made in the early autumn when the bills are sent out. This insures prompt notification of the subscription managers of *Science* and of the OHIO JOURNAL OF SCIENCE and uninterrupted delivery of the two journals. Unless the Treasurer has the unanimous co-operation of the members in the matter of promptness, he cannot assure them of immediate attention. He is at all times glad to have reports of errors or delays and willing to do everything he can to adjust matters to the satisfaction and convenience of the members. During the year the present Treasurer has just served he has done practically all the work of billing, dunning, and corresponding unaided. This was done, not so much with the desire to save the slight cost of additional help, as in the hope that he might come to know all the details of the job and especially to straighten out accounts of members in arrears. It is to be hoped that members will take care of their arrearage sooner in the future, but this matter, in the case of those members of the Academy who are also A. A. A. S. members, will quickly adjust itself. In the itemized account of the funds the deposits are somewhat swelled because of arrearage. Because there is no adequate adjustment of this for the OHIO JOURNAL an increase to the JOURNAL was given this year.

While this increase for the JOURNAL comes at a time when it is greatly needed, it should be clear in the minds of the members that the Treasurer does not condone arrearages. A periodical journal can not subsist on alternate fat and lean years. It is desirable that its pabulum be more evenly distributed. Further the Treasurer is definitely preparing to meet the future expansion of the OHIO JOURNAL OF SCIENCE. He believes in it thoroughly and wishes to make it an adequate medium of expression for all the members. The JOURNAL ought to appeal especially to the younger members of the Academy. They need to publish articles in order to become introduced to the older scientific workers. The Treasurer feels that all the money that can be put into the JOURNAL is still not nearly enough to make it the best one of its kind in the country. By making it attractive, the JOURNAL can continue to publish some of the best articles that the members of the Academy can write.

The Treasurer further wishes to call the attention of the members to the fact that Mr. L. H. Tiffany of the Department of Botany of the Ohio State University, has been appointed subscription manager of the JOURNAL. It is his duty to see that all members who have squared accounts with the Treasurer be supplied with all numbers of the JOURNAL to which they are entitled, without further charges. He is at present attending to all cases of non-delivery of the JOURNAL that have come to his attention. All complaints in the matter of the delivery of the JOURNAL sent to Mr. Tiffany can now be cared for. It is thus to be hoped that the members of the Academy will be promptly served.

Respectfully submitted,

A. E. WALLER, *Treasurer.*

We have examined the above report and found it to be correct.

Respectfully submitted,

L. B. WALTON,

E. L. FULLMER,

Auditing Committee.

Report of the Executive Committee.

The report of the Executive Committee was received as follows and ordered filed:

March 25, 1921.

To the Ohio Academy of Science:

A meeting of the Executive Committee was held in Columbus, December 18, 1920; all members of the Committee were present.

An invitation was received from Western Reserve University and Case School of Applied Science to hold the Annual Meeting for 1921 in Cleveland. The Executive Committee voted unanimously to accept this invitation, and set the date of the meeting for April 1 and 2. The date was later changed by correspondence to March 25 and 26, in order to bring it within the spring recess of Western Reserve University.

The Secretary reported correspondence with Prof. R. C. Friesner, Chairman of the Program Committee of the Indiana Academy of Science, relative to the possibility of a joint field meeting of the two Academies this spring. The joint meeting is rendered difficult by the fact that the Indiana Academy holds a fall meeting for the presentation of papers and a field meeting in the spring, while the Constitution of the Ohio Academy restricts the Annual Meeting to March or April. A joint meeting in the spring must either debar the Ohio Academy from the opportunity for presentation of papers or eliminate the field meeting from the program of the Indiana Academy. The Executive Committee voted its general approval of a joint meeting at some future date, and instructed the Secretary to continue negotiations with the Indiana Academy. The Committee further instructed the Secretary to give notice to the Academy of a proposed amendment to the Constitution removing the present restriction as to the date of the Annual Meeting, unless such amendment shall prove to be contrary to the Charter of the Academy.

The Executive Committee recommended to the Joint Committee on the Election of Fellows that an opportunity be given this year for the nomination of fellows by the present fellows of the Academy on the lines suggested in the pending Constitutional amendment.

Professor Blake was requested to make an investigation of the desirability of an affiliation of the Academy with the Ohio Association of Technical Societies, as suggested in the Annual Meeting of 1919.

The President, Mr. Alexander, was requested to act as Chairman of the Committee on Legislation during the absence of Professor Osborn.

A second meeting was held in Cleveland on the evening of March 24, at which this report was adopted. The President, Treasurer and Secretary were present at this meeting.

Thirty-six new members have been elected during the year, subject to the ratification of the present meeting.

EDWARD L. RICE, *Secretary,*
For the Committee.

Report of the Publication Committee.

The following report of the Publication Committee was received and ordered filed:

The Annual Report of the Thirtieth Meeting (Proc. Ohio Acad. Sci., Vol. VII, Part 5, pp. 117-158) was published on January 17, 1921. It contains the Constitution and By-Laws in addition to the usual matter. Fifty reprints each of the list of members and of the Constitution were also printed. The present arrangement of printing the Secretary's report in the November issue of the OHIO JOURNAL OF SCIENCE followed soon after by the complete annual report seems satisfactory.

Respectfully submitted,

JOHN H. SCHAFFNER, *Chairman.*

Report of Library Committee.

A brief report for the Library Committee was prepared for the meeting by Mr. Reeder; but, owing to a delay in the mail, this report was not received by the secretary until after the close of the meeting. The following report has since been received for publication.

March 23, 1921.

To the Ohio Academy of Science:

The Library Committee begs leave to submit the following report:

(1) The sale of publications during the year has amounted to \$1295.

(2) The Proceedings of the 30th annual meeting of the Academy were published in the OHIO JOURNAL OF SCIENCE for November, 1920. Reprints were received late in February and copies were mailed immediately to all persons on the membership roll and to sixty-eight institutions on the exchange list.

(3) The University Library again calls to the attention of the Academy its willingness to lend to any member, through his institutional library, any publication needed in research work. The library is receiving the exchanges from the Ohio Academy and from the OHIO JOURNAL OF SCIENCE, and together with its own purchases and collections in the scientific fields, there is available a remarkable source of literature for advanced study and research. It is hoped that more use will be made of these sources by the scientific men of Ohio.

Very respectfully,

C. W. REEDER.

Report of the Trustees of the Research Fund.

The following report of the Trustees of the Research Fund was received and ordered filed. The financial portion of the report was referred to the Auditing Committee, whose report is appended.

To the Ohio Academy of Science:

The Trustees of the Research Fund submit the following report for the period from May 12, 1920, (the date on which the last report was made), to March 1, 1921.

During this period only two payments from the fund were made: To L. B. Walton, the balance of the grant made to him in 1917, for the study of fresh water organisms; to Miss Elsie Jordan, for a continuation of the work of relabeling the Harper collection of Naiades, under the direction of W. H. Beecher, to whom the grant was made.

Unexpended balances remain to the credit of A. E. Waller, for the study of Ohio vegetation, and to W. H. Bucher, for aid in the making of a geological map of the disturbed area in Adams County, Ohio.

A grant of \$150 was made on January 10, 1921, to W. J. Koster, to aid in a survey of the Orthopteran fauna of Ohio.

Correspondence is in progress which may lead to a renewal of the grant made to Paul B. Sears on June 1, 1919, and a further allotment to W. H. Bucher, for the continuation of work originally undertaken by them.

Below is a tabulated statement of receipts and expenditures during the period covered by this report. In this, it will be noted, is included a one hundred dollar Liberty Bond received from the Treasurer of the Academy to be added to the Research Fund and which is held as a more or less permanent investment along with that purchased in 1918. The accrued interest on both of these bonds is added to the active assets of the funds.

At present the amount available for allotment is \$569.96, from which it will appear that the demand for the somewhat restricted financial aid to research which this fund furnishes has not been very great during the past year.

Vouchers for all expenditures are submitted herewith, together with the Cashier's certificate of the balance in the bank on March 1, 1921.

RECEIPTS.

Cash in bank May 1, 1920, as per report of that date..	\$644.68
Interest on new Liberty Bond, May 15 and July 28, 1920	6.27
Interest on Liberty Bonds, Feb. 23, 1921.....	12.76
Check from Mr. W. Gluttin, Feb. 23, 1921.....	250.00
	\$913.71

EXPENDITURES.

Elsie Jordan, June 19, 1920.....	\$22.50
L. B. Walton, January 7, 1921.....	20.31
	42.81

ASSETS.

Cash in bank, March 1, 1921.....	870.90
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Total Assets, Liberty Bonds at par.....\$1,470.90

LIABILITIES (UNDER GRANTS)

A. E. Waller.....	\$ 75.00
W. H. Bucher.....	75.94
W. J. Koster.....	150.00
	\$300.94

Excess of Available Assets over Liabilities.....\$569.96

(Signed) T. C. MENDENHALL, *Chairman.*
HERBERT OSBORN.

We have examined the report and found it to be correct.

L. B. WALTON,
E. L. FULLMER,

March 25, 1921.

Auditing Committee.

Report of Committee on Legislation.

Professor Herbert Osborn, chairman of the Committee on Legislation, submitted the draft of a proposed bill looking to recognition and financial support of the Academy by the State. The bill, as submitted, is modeled after that establishing the State Archaeological Society. It was written by Mr. Edge, official "bill drafter" for the Assembly, in consultation with President Alexander, who acted as chairman of the Committee during Professor Osborn's absence from Ohio.

After extended discussion, the report was adopted by the Academy, with minor amendments of the bill, and the Committee was continued with instructions to carry on the campaign. President Alexander was added to the Committee, which, as now constituted, consists of the following: Herbert Osborn, chairman; W. H. Alexander, T. C. Mendenhall, M. M. Metcalf, E. L. Rice, L. B. Walton.

The Committee was instructed to draft such revision of the Constitution of the Academy as may be necessary in case the bill is passed by the Assembly, this action to be interpreted as notice of amendment of the Constitution and as enabling the Academy to take final action at the next annual meeting.

The proposed bill, including the amendments voted by the Academy, follows:

A BILL

Relative to State recognition of the Ohio Academy of Science.

Be it Enacted by the General Assembly of the State of Ohio:

SECTION 1. The Ohio Academy of Science, a corporation not for profit, incorporated under the laws of Ohio, March 12, 1892, shall be under the control of a board of trustees consisting of fifteen members to serve without salary or per diem. Six of the members of the board shall be appointed by the governor with the advice and consent of the Senate, two to serve for two years, two to serve for four years and two to serve for six years, and until their successors are appointed and qualified, and thereafter two members shall be appointed every two years to serve for a term of six years. The remaining nine members of the board shall be elected by the members of the Academy.

SECTION 2. On and after the passage of this act, the Ohio Academy of Science shall constitute an official source of advice and information on all scientific questions within its field submitted to it by any state department or officer thereof. The services of the Academy shall be available to the state or any of its officers in any matter within its field in which the consideration of scientific facts or policies may be involved, and the officers of the state may call upon the Academy of Science, through its properly elected officers or committees appointed by its officers, for such consultation and advice as may be of service to them in their duties. The members of such committees shall receive no compensation for their services, except that all traveling, clerical and other necessary expenses shall be

paid. No member of the Ohio Academy of Science, while serving on any such committee, shall be eligible for expert service under advice from said committee for which compensation from the state is received.

SECTION 3. One copy of the "Proceedings of the Academy" shall be distributed to each public library and museum, university, college, normal schools, and first grade high school in the state, and one copy of each number of its official organ, "The Ohio Journal of Science," shall be distributed to each university and college in the state. All exchanges received shall be kept available to the citizens of the state through the library of The Ohio State University, or such other channel as may be determined.

SECTION 4. The secretary of the Ohio Academy of Science shall be a person well suited by training and experience to perform his duties and may be paid from state funds.

SECTION 5. The legislature shall make such appropriations from year to year as may be necessary to print the official publications of said Academy and to carry out the other provisions of this act.

Report of Committee on Preservation of Wild Life of State.

In addition to an oral report by the chairman concerning the conservation work already accomplished in Ohio and other states, the Committee presented the following formal recommendations. The recommendations were adopted by the Academy, and the Committee continued under the changed name suggested: Committee on State Parks and Conservation.

The Committee on Preservation of Wild Life of State would recommend:

(1) That the present Committee be continued as a Committee on State Parks and Conservation, to study the various problems involved and to report a matured plan for further action by the Academy.

(2) That all members co-operate in listing suitable tracts for use as state parks, bird reserves, and reservations for the permanent preservation of areas possessing scenic, geologic, or biologic interest.

(3) That the committee proceed to secure co-operation with existing organizations in the preservation of natural conditions in the state forests, game refuges, state controlled tracts, and other areas where such co-operation is possible.

HERBERT OSBORN,
J. ERNEST CARMAN,
FRANCIS H. HERRICK,
C. G. SHATZER,
E. N. TRANSEAU,
MAYNARD M. METCALF,
Committee.

Report of Committee on Election of Fellows.

The following report of the Committee on Election of Fellows was accepted and ordered filed:

March 25, 1921.

To the Ohio Academy of Science:

The method of work of the Committee on the Election of Fellows has been as follows:

(1) Through the preliminary announcement of this meeting, the entire membership of the Academy was given the opportunity to make nominations for fellowship. A single nomination was received.

(2) Copies of the membership list were mailed by the Secretary to the eleven members of the joint committee to be checked as nominating ballots. Nine ballots were returned. Five members received three ballots each, four received two ballots, and thirty-four received one ballot.

(3) A meeting was held in Cleveland on the evening of March 24th, at which seven members of the joint committee were present, two were represented by duly authorized proxies, two were absent without representation.

After careful consideration and discussion, seventeen members received the necessary nine votes and were declared elected to fellowship in the Academy. The newly elected fellows will be personally notified, and the list will appear in the Proceedings.

In addition to the constitutional specification of "productive scientific work" as a condition for fellowship, the committee has been guided by the following principles, which it recommends as a general policy for future action:

(1) Members should not be elected to fellowship in the Academy until one year, at least, after election to membership.

(2) Resident members should not be elected to fellowship who are not showing an active interest in the work of the Academy.

This year's committee, like that of last year, took the ground that its action should be conservative. It is probable that good candidates for fellowship have been passed over; it will be the duty of future committees to correct these omissions.

Respectfully submitted,

EDWARD L. RICE, *Secretary.*,
For the Committee.

The list of members elected to fellowship is as follows:

G. F. ARPS

H. H. M. BOWMAN

E. LUCY BRAUN

HAROLD E. BURTT

DWIGHT M. DELONG

CARL DRAKE

WM. LLOYD EVANS

EMERY R. HAYHURST

WM. E. HENDERSON

J. S. HOUSER

JAMES ERNEST KINDRED

SIDNEY ISAAC KORNHAUSER

FLORENCE MATEER

H. C. OBERHOLSER

PAUL B. SEARS

VICTOR STERKI

B. W. WELLS

Election of Officers.

The following officers and committee members for 1921-'22 were elected by the ballot of the Academy:

President—Professor R. C. OSBURN, Ohio State University, Columbus.

Vice-Presidents:

Zoology—Dr. J. E. KINDRED, Western Reserve University, Cleveland.

Botany—Professor E. N. TRANSEAU, Ohio State University, Columbus.

Geology—Professor J. E. HYDE, Western Reserve University, Cleveland.

Physics—Professor W. G. HORMELL, Ohio Wesleyan University, Delaware.

Medical Sciences—Professor F. C. WAITE, Western Reserve University, Cleveland.

Psychology—Professor RUDOLPH PINTNER, Ohio State University, Columbus.

(Professor Pintner later resigned the Vice-Presidency, owing to removal from the state, and was appointed by the Executive Committee to fill the vacancy.)

Secretary—Professor E. L. RICE, Ohio Wesleyan University, Delaware.

Treasurer—Dr. A. E. WALLER, Ohio State University, Columbus.

Elective Members of Executive Committee—Mr. W. H. ALEXANDER, U. S. Weather Bureau, Columbus; Professor L. B. WALTON, Kenyon College, Gambier.

Member of Publication Committee—Professor L. G. WESTGATE, Ohio Wesleyan University, Delaware.

Trustee of Research Fund—Dr. T. C. MENDENHALL, Ravenna.

Member of Library Committee—Professor W. C. MILLS, Ohio State University, Columbus.

Representatives on Editorial Board of Ohio Journal of Science:

Zoology—Professor R. A. BUDINGTON, Oberlin College, Oberlin.

Botany—Professor BRUCE FINK, Miami University, Oxford.

Geology—Professor G. D. HUBBARD, Oberlin College, Oberlin.

Physics—Professor S. J. M. ALLEN, University of Cincinnati, Cincinnati.

Medical Sciences—Professor F. C. WAITE, Western Reserve University, Cleveland.

Psychology—Professor H. A. AIKINS, Western Reserve University, Cleveland.

Election of Members.

The Membership Committee reported eleven names for election to membership; thirty-six additional names, previously approved by the Executive Committee and marked with (*) in the following list, were presented for ratification. All were elected, as follows:

- *AINSLEE, GEO. G.; Entomology; U. S. Entomological Laboratory, R. D. 9, Knoxville, Tenn.
- ALTAFFER, L. B., Chemistry; 7013 Clinton Ave., Cleveland.
- *BEAN, RAYMOND JACKSON; Physiology, Embryology; Biological Laboratory, Western Reserve University, Cleveland.
- *CHASE, SAMUEL WOOD, Zoology; 1353 E. 9th St., Cleveland.
- *CHASSELL, LAURA M., Psychology; Dept. of Psychology, Ohio State University, Columbus.
- *CLAYTON, EDWARD E.; Botany; Botany and Zoology Bldg., Ohio State University, Columbus.
- *DEVEREAUX, W. C.; Meteorology; Weather Bureau Office, Cincinnati.
- *DOBBINS, RAYMOND A.; Botany, Entomology; Dept. of Botany, Ohio State University, Columbus.
- *DOCKERAY, F. C.; Psychology; Ohio Wesleyan University, Delaware.
- *EMERY, E. H.; Meteorology; 829 Society for Savings Bldg., Cleveland.
- *FRIEDLANDER, MAE; Bacteriology, Biology; 343 Carroll St., Akron.
- *GODDARD, HENRY H.; Psychology, Sociology; 1638 Granville St., Columbus.
- *HARTLEY, EDWIN A.; Entomology; Dept. of Zoology and Entomology, Ohio State University, Columbus.
- *HAYHURST, EMERY R.; Medical Sciences; Dept. of Public Health and Sanitation, Ohio State University, Columbus.
- HILLS, MYRA E.; Psychology; 2066 E. 100th St., Cleveland.
- *JONES, J. W. L.; Psychology; Heidelberg University, Tiffin.
- *KNOUFF, RALPH A.; Medical Sciences; Ohio State University, Columbus.
- *LUCKEY, BERTHA M.; Psychology; Board of Education, Cleveland.
- *MANSON, EDMUND S., JR.; Astronomy, Physics, Mathematics; Ohio State University, Columbus.
- *MARSHALL, HELEN; Psychology; Ohio State University, Columbus.
- MARTIN, JOHN R.; Physics; Dept. of Physics, Case School of Applied Science, Cleveland.
- MATHER, KIRTLEY F.; Geology; Denison University, Granville.
- MOORE, DWIGHT M.; Botany; Granville.
- *MORSE, PAUL FRANKLIN; Geology; Asst. State Geologist, Jackson, Miss.
- *MOXOM, WALTER J.; Meteorology, Physics, Psychology; U. S. Weather Bureau Office, Dayton.
- *MURCHISON, CARL; Psychology; The Tallawanda, Oxford.

- *MYERS, GARRY C.; Psychology; Cleveland School of Education, Cleveland.
- NIEHAUS, WM. E.; Zoology, Geology; Berea.
- *OLIN, OSCAR E.; Psychology, Sociology; University of Akron, Akron.
- *PATTEN, BRADLEY M.; Zoology, especially Embryology; 1353 E. Ninth St., Cleveland.
- *PATTON, LEROY; Geology; Muskingum College, New Concord.
- *REA, PAUL M.; Natural History Sciences, especially Zoology; The Cleveland Museum of Natural History, Cleveland.
- RILEY, C. L.; Biology, Geology; 1219 Logan Ave., N. W., Canton.
- *ROOTS, YALE K.; Physics; 412 N. Walnut St., Wooster.
- ROSS, HERBERT W.; Chemistry, Geology; West Technical High School, Cleveland.
- *SAYRE, JASPER D.; Botany; Dept. of Botany, Ohio State University, Columbus.
- *SKAGGS, ERNEST B.; Psychology; 23 S. Union St., Delaware.
- SMITH, ELLA THEA; Botany, Zoology; P. O. Box 7, Salem.
- SMITH, ERNEST RICE; Geology, Paleontology; 130 Woodland Ave., Oberlin.
- *STONE, JULIUS F., General Science, Grandview, Columbus.
- *STRAUSBAUGH, P. D.; Botany, Microchemistry as applied to Plant Physiology; Burbank Road, R. F. D. 10, Wooster.
- TIPPIE, WILLIAM A.; Physics; 2145 W. 100th St., Cleveland.
- *WATSON, A. C.; Psychology; Marietta College, Marietta.
- *WEBB, ROBERT FULTON; Geology; Dept. of Geology, Ohio State University, Columbus.
- *WILLIAMS, R. D.; Philosophy, Psychology; Dept. of Philosophy, Ohio State University, Columbus.
- *WURDACK, MARY E.; Botany; 29 Twelfth Ave., Columbus.
- *YOUNG, HERMAN H.; Psychology, Educational Research; 235 Chapel Place, Youngstown.

Report of Committee on Necrology.

The following report of the Committee on Necrology was adopted by the Academy and ordered filed.

THOMAS PIWONKA.

September 10, 1854—May 9, 1920.

I first met Thomas Piwonka on the field excursion of the Academy for geology in May, 1919. The failing sight and frailty of age prevented him from participating in full, and he carefully withheld himself from much of the trip that he might not in any way impede the progress of the party. This thought for others was characteristic.

This was less than a year before his death. I saw him but six or eight times in the interval, but these meetings brought us together on the Cleveland shale outcrops of Big Creek which he had often searched for Devonian fish, in his own study and in my laboratory. There are

few men that it is possible to know on so short an acquaintance, yet due to a common interest in fossils. I may, I believe, fairly claim to have attained a certain intimacy with him.

It began when he modestly offered to go with me and show me, if I cared to have him, the localities where Dr. Clark, of Berea, had been most successful in his search for fossil fish. "If I cared!" To me, it is an opportunity forever lost that I was able to visit only one locality with this man who had been the intimate companion of Dr. Clark, the indefatigable collector, and Edward Claypole, the elucidator, of the Cleveland shale fish.

With the same modesty, almost with depreciation lest he might seem to intrude himself, he invited me to look over his small collection of fossils from the Cleveland district. When he learned that Western Reserve University possessed almost nothing from the Cleveland shale, he offered me anything of his from that formation "which might be worth having;" the University gratefully received it all. After his death, Mrs. Piwonka, at his request offered the remainder of the collection to the University, "such portion as might be thought worth having." The whole collection is not large, but contains much material from the Cleveland and Sandusky regions, all carefully marked as to locality, all valuable, particularly that from the Cleveland shale which yields material only on long careful search. Some of the material is unique. In earlier years, he had been equally generous with his findings, and the collections of both the United States Geological Survey and of the Dominion Geological Survey of Canada, have been enriched at his hands; in the days when Dr. Clark combed all Cleveland fish-producing localities twice yearly, an occasional choice specimen was obtain by him from Mr. Piwonka, which must since have lodged either in the British Museum or the American Museum of Natural History.

Before his death, he donated to the Department of Geology of Western Reserve University a generous sum of money to defray expenses of members of the department in making extensive field trips or elaborate collections. The donation was unsolicited, and was made with the firm assertion that he did not do it in any effort to perpetuate his name (indeed, he rather insisted that his name be left out of it); that though fortune had not been lavish with him, yet she had not been unkind, perhaps kinder than to most individuals engaged in University work, and he wished to defray a part of the expense that they are frequently put to in the prosecution of their interests. This sum has already been of service, and will be of yet more service, in the recovery of the last fish and amphibian remains that can possibly be obtained from the famous old Linton Coal-Measures locality of eastern Ohio.

Mr. Piwonka was born in New York City of Bohemian stock. He was valedictorian of his class from Central High School, Cleveland. His interest in natural science was first aroused by S. G. Williams, then a teacher in Central High School (who later became Professor of Education in Cornell University, and whose collection forms the bulk of the paleontological collection of Western Reserve University). After

graduation, Mr. Piwonka acted as secretary to the superintendent of schools for several years, during which time he found time to prepare himself for admission to the bar in 1876. His life-work was law, but in spare moments he was a naturalist with particular interest in geology, botany and microscopy. His passing removes one more (very few are left) of that generation of men interested in the natural history of their locality, with the collector's keen instinct, to which paleontology is profoundly indebted. With them is passing a phase of our culture.

J. E. HYDE, *Committee.*

Report of Committee on Resolutions.

The following resolutions were presented by the Committee on Resolutions and adopted by the Academy:

(1) The Academy wishes to thank the Local Committee, the officers of Western Reserve University and Case School of Applied Science for their efforts in making the Thirty-first Annual Meeting of the Ohio Academy of Science a success.

(2) The Academy wishes to express its appreciation of the continued interest and financial support given to the research work of this Academy by Mr. Emerson McMillin.

(3) The Academy wishes to express to Professor Charles A. Kofoid, of the University of California, its thanks for the special lecture on "Hookworm and Human Efficiency."

(4) The Academy wishes to thank again Professor E. L. Rice for his efficient services as Secretary of this Academy.

C. G. SHATZER.

RAYMOND C. OSBURN.

WALTER H. BUCHER.

Amendment of Constitution.

ART. V, SECTION 3. *Election of Fellows.* Amended to read: Fellows shall be elected by joint action of the Executive Committee and the Vice-Presidents, from nominations endorsed by two fellows of the Academy. Such nominations shall be accompanied by documentary evidence of the candidate's scientific achievements upon which the nomination is based. Approval by three-fourths of this joint committee shall be necessary to election.

Amendment of By-Laws.

CHAP. III, SECTION 5. *Nomination of Fellows.* New section, to read: A suitable blank for nomination of fellows shall be supplied by the Secretary and shall be mailed to each member of the Academy at least once each year.

CHAP. IV, SECTION 2. *Nominations.* Amended to read: The Academy shall elect by ballot a Nominating Committee, consisting of one representative from each regularly organized Section of the Academy, who shall nominate a candidate for each office, including elective members of the Executive Committee, the Publication Committee, and the Trustees of the Research Fund. Additional nominations may be made by any member of the Academy.

Proposed Amendment of Constitution.

The following amended form of Art. VI, Section 1, was proposed by the Executive Committee for action at the next annual meeting: *Annual Meeting.* The date and place of the Annual Meeting shall be fixed by Executive Committee, subject to such instructions as shall be determined by the Academy at the preceding annual meeting, and shall be announced by circular at least thirty days before the meeting. The details of the daily sessions of each meeting shall be arranged by the Program Committee and announced in the official program immediately before the meeting.

The Committee on Legislation was also instructed to make such revision of the Constitution and By-Laws as may be necessitated in case the Legislature shall pass the proposed bill providing for State support of the Academy, this instruction to be interpreted as notice of proposed amendment, enabling definitive action at the next annual meeting.

Certificate of Election to Fellowship.

The Secretary was instructed to prepare a suitable certificate to be presented to each newly elected fellow in the Academy.

Appeal from University of Debreczen.

An appeal from the Director of the Geographical Institute of the Royal University of Debreczen (Hungary), under date of December 7, 1920, for "books, used clothes, and even little sums of money" for the desperately needy students of the department, was read by the Secretary. No action was taken by the Academy beyond thus calling the matter to the attention of the individual members.

Scientific Sessions.

The complete scientific program of the meeting follows:

PRESIDENTIAL ADDRESS.

Thunderstorms; especially those of Ohio.....W. H. ALEXANDER

PUBLIC LECTURES.

Hookworm and human efficiency.....CHARLES A. KOFOID
Scientific work at the Ohio Bureau of Juvenile Research....HENRY H. GODDARD

PAPERS.

1. The new Cleveland Museum of Natural History. (15 min.)....PAUL M. REA
2. The state park situation in Ohio. (15 min.).....J. ERNEST CARMAN
3. Chronological view of men of science. (7 min.).....J. A. CULLER
4. A peculiar case of stature inheritance. (3 min.).....A. B. PLOWMAN
5. A differential sensitivity theory of time and space and its bearing on evolution. (7 min.).....L. B. WALTON
6. The relation of the biologist to public health administration. (15 min.),
A. B. PLOWMAN
7. The function of the striae and the origin of bilateral symmetry in the euglenoids. (15 min.) (Lantern).....L. B. WALTON
8. The geographical distribution of the genera of Opalinidae. (20 min.),
(Opaque projection).....MAYNARD M. METCALF
9. Hemiptera of the Adirondacks. (10 min.) (Lantern).....HERBERT OSBORN
10. Collecting in southern Florida. (10 min.).....HERBERT OSBORN
11. Some studies in Hessian fly emergence. (10 min.) (Lantern)..T. H. PARKS
12. Notes on the habits and life history of *Galeatus peckhami* Ashm.
(5 min.) (Lantern).....CARL J. DRAKE
13. A new Ambrosia beetle: notes on the work of *Xyloterinus politus* Say.
(6 min.) (Lantern).....CARL J. DRAKE
14. Phylogeny and distribution of the genus *Libellula*. (20 min.) (Lantern),
CLARENCE H. KENNEDY
15. Aids in teaching elementary cytology. (By title).....Z. P. METCALF
16. The cytology of the sea-side earwig *Anisolabis*. (15 min.)..S. I. KORNHAUSER
17. Copulation in *Planaria maculata*. (5 min.).....R. A. BUDINGTON
18. On the regulative capacity of the neural tube. (15 min.) (Lantern),
H. L. WIEMAN
19. The musculature of the head and throat of the *Chimaera ogilvyi*. (15 min.)
(Lantern).....MAE FREIDLANDER
20. New models of the development of the heart in the chick. (20 min.),
BRADLEY M. PATTEN
21. Some features of the morphology of the kidney of *Necturus*. (20 min.),
S. W. CHASE
22. Orientation in the cat. (5 min.).....FRANCIS H. HERRICK
23. Diet of a captive mole. (5 min.).....E. L. MOSELEY
24. Additions to the birds of Ohio. (10 min.).....LYNDA JONES
25. Phagocytoses and clotting in the perivisceral fluid of *Arbacia*. (10 min.),
J. E. KINDRED

26. Further observations as to effect of thyroid substance on plant protoplasm. (5 min.).....R. A. BUDINGTON
27. The origin and development of the prairie in North America. (40 min.), (Lantern).....H. C. SAMPSON
28. The significance of native vegetation in crop production. (35 min.), (Lantern).....A. E. WALLER
29. Energy relations of an acre of corn. (5 min.).....E. N. TRANSEAU
30. Some energy relations of aquatic life and their significance. (10 min.), L. H. TIFFANY
31. Contributions to the genetics and cytology of parthenogenetic *Taraxaca*. (5 min.).....PAUL B. SEARS
32. Reversal of the sexual state in the Japanese hop. (10 min.)..J. H. SCHAEFFNER
33. The occurrence and abundance of certain algae in Lake Erie. (10 min.), MALCOLM E. STICKNEY
34. The census of flowering plants on certain small islands of Lake Erie. (8 min.).....MALCOLM E. STICKNEY
35. Causes and consequences of the irregularities in the glacial border in the Ohio Valley. (30 min. (Lantern)).....G. FREDERICK WRIGHT
36. Explorations in Eastern Bolivia. (20 min.).....K. F. MATHER
37. Some sub-surface rock channels filled with glacial material. (15 min.), J. ERNEST CARMAN
38. A fault-zone breccia in the Bass Island series. (10 min.)..J. ERNEST CARMAN
39. A disconformable contact at the base of the Sylvania sandstone. (5 min.) J. ERNEST CARMAN
40. The Ordovician and Silurian seas of American Arctic and Subarctic regions and the relation of their faunas to contemporaneous seas of European areas. (20 min.).....AUG. F. FOERSTE
41. Some coastal geology of southern Florida. (20 min.).....G. F. LAMB
42. An interpretation of some Ohio geology. (12 min.).....G. F. LAMB
43. Richmond Ostracoda of especial interest. (10 min.).....W. H. SHIDELER
44. Additions to our knowledge of the Arnheim. (10 min.)...W. H. SHIDELER
45. A Pliocene brackish water fauna near Alexander, La. (10 min.)..E. R. SMITH
46. A modification of Hobbs's method of teaching interpretation of geologic maps. (10 min.).....E. R. SMITH
47. An embryonic volcano in Adams County, Ohio. (15 min.), WALTER H. BUCHER
48. Local geology of Cleveland from an economic standpoint. (25 min.), (Lantern).....FRANK R. VAN HORN
49. The reopening and the end of the Linton (Ohio) Coal-measures, fossil-amphibian locality. (10 min.).....J. E. HYDE
50. The fauna of the Berea Grit; a recurrent Bedford fauna, and its bearing on the age of the Bedford. (15 min.).....J. E. HYDE
51. Some psychology applied to Americanization. (20 min.)..GARRY C. MYERS
52. Scientific direction of childhood—America's greatest social and political responsibility. (30 min.).....HERMAN H. YOUNG
53. Reliability of survey methods in individual diagnosis. (20 min.), FLORENCE FITZGERALD
54. Limiting factors in human behavior. (5 min.).....A. P. WISE
55. Waste of mental ability in our school system. (10 min.)...HELEN MARSHALL
56. (a) Some studies in progress in the Cleveland School of Education.
(b) Some data on learning curves. (30 min.).....GARRY C. MYERS
57. College men in the penitentiary. (20 min.).....CARL MURCHISON

58. A preliminary report on retroactive inhibition (with particular reference to two conditions). (20 min.).....E. B. SKAGGS
59. The measurement of psychological effects of fatigue and low oxygen. (20 min. (Lantern)).....C. F. DOCKERAY
60. Discussion of the legal status of psychology in Ohio State.
Discussion led by H. AUSTIN AIKINS

DEMONSTRATIONS.

- (a) Chromosomal complexes of *Anisolabis*.....S. I. KORNHAUSER
- (b) Geographic distribution maps for the Opalinidae and their hosts,
MAYNARD M. METCALF
- (c) New models of development of the heart in the chick....BRADLEY M. PATTEN
- (d) Chart and data relating to an interesting case of stature inheritance,
A. B. PLOWMAN
- (e) Multiple ova in Graafian follicles of cat.....EDWARD L. RICE
- (f) Sulphur dioxide injury to vegetation.....A. E. WALLER
- (g) Illustrations of euglenoids.....L. B. WALTON

THUNDERSTORMS: ESPECIALLY THOSE OF OHIO.*

WILLIAM H. ALEXANDER

Meteorologist, U. S. Weather Bureau, Columbus, Ohio

I. THUNDERSTORMS IN GENERAL.

1. *Introduction*

The typical thunderstorm, that is, the thunderstorm complete in every detail from its beginning to its ending, has ever held a unique place in the world of human thought and speculation as evidenced by its large and conspicuous place in ancient mythology, by its scarcely less conspicuous place in the history and literature of the race, and by the earnest consideration it has received from the brightest minds of the scientific age. Not only so, but its physical characteristics are such as to assure it a place of real and permanent interest in our present and future thinking along meteorological lines.

We are told upon apparently good authority[†] that more myths have gathered about the thunderstorm and its phenomena than about any other natural phenomenon, except possibly light and darkness. And we are quite prepared to believe it when we recall the ominous stillness of the air, the darkness of the sky, the lurid glare of the clouds, the majestic roar of the thunder, and the indescribable effects of the highly electrified bodies on the nerves of many people. If these storms inspire so much awe in the human mind in a scientific age—in these days of our boasted intellectual emancipation—with what unspeakable awe must the primitive mind have regarded them! No wonder the thunderstorm was looked upon as a mystery that pressed for solution or explanation. These early “explanations” have come down to us as myths, which, like most myths, are of interest to us chiefly because they constitute the first efforts of the human mind to explain natural phenomena. Then, as now, a thing was regarded as *explained* when classified with other things with which we are acquainted.

*Presidential address, delivered at the Cleveland meeting of the Ohio Academy of Science.

†For numbers of reference, consult bibliography at close of paper.

We explain, for example, the origin, the progress and the ending of a thunderstorm when we classify the phenomena presented by it with other more familiar phenomena of vaporization and condensation. But primitive man explained the same thing, to his own satisfaction at least, when he classified it along with the well-known phenomena of human volition by constructing a theory of a great black dragon pierced by the unerring arrows of an heavenly archer. As late as 1600, a German writer would illustrate a thunderstorm destroying a crop of corn by the picture of a dragon devouring the produce of the field with his flaming tongue and iron teeth. But we of today no longer regard the thunderstorm as an object of terror or as an unfathomable mystery, but rather as a natural phenomenon of great economic and scientific interest, one in every way worthy of our best and most serious consideration.

The physics and physical features of the thunderstorm are, we believe, fairly well understood. These have been ably and fully discussed by Professor Humphreys of the U. S. Weather Bureau, whose teaching we follow very closely in this discussion. If the thunderstorm produced *only* lightning and thunder, it would be of only relative importance, but it may bring along a whole series of redoubtable phenomena, thus presenting problems of real practical importance—problems the magnitude and importance of which are not always fully appreciated.

2. Definition

And now, first of all, let us ask and answer, if we can, this question: "What is a thunderstorm?" Ordinarily, for example, we think of a windstorm as a storm characterized by high and perhaps destructive *winds*; of a hailstorm as one characterized by the production of *hail*; of a snowstorm as one that produces *snow*; of a dust storm as one characterized by a great quantity of flying *dust*; and so, quite properly, we think of a thunderstorm as a storm characterized by *thunder* and lightning. This may not, I grant you, serve as a satisfactory *definition*, but it will, perhaps, be a sufficient *answer* for the time being to the question asked.

It is not necessary in this presence, perhaps, to point out that the "snow," the "wind," the "hail," and the "dust," are in no sense the *cause* of the storm to which they give name.

Nor, so far as known, have the lightning and thunder any influence on the formation, progress and termination of the thunder-storm, although they may and often do constitute the most impressive, spectacular, and even tragic features of the storm. For as Prof. Humphreys well says,² "No matter how impressive or how terrifying these phenomena may be, they never are anything more than mere incidents to or products of the peculiar storms they accompany. In short, they are never in any sense either storm-originating or storm-controlling factors."

3. *Source of the Lightning*

Since we cannot have a thunderstorm without thunder, and cannot have thunder without *lightning*, it seems quite essential to a proper understanding of these storms to get a correct, scientific explanation of the source or cause of the lightning. Oh, yes, we are fully aware of the danger just here—namely, how easily and how quickly one may get beyond his depth when talking about the origin of electricity. We must admit, of course, that we know very little if anything for certain at this point, but then we would like to *appear* to know something about this interesting phase of our discussion. We are deeply indebted to Dr. G. C. Simpson³ of the Indian Meteorological Department for our best information or knowledge on this point. Dr. Simpson, by numerous observations and laboratory experiments found out a great many extremely valuable things concerning the electricity brought down by the raindrop and the snowflake, and at the same time, by means of a number of well-devised experiments, determined the electrical effects of each obvious process that takes place in the thunderstorm. He found out, for example, that no electrification resulted from freezing and thawing, air-friction, etc., but that when he allowed drops of *distilled water* to fall through a vertical blast of air of sufficient strength to produce some spray,

- (1) That breaking of drops of water is accompanied by the production of both positive and negative ions.
- (2) That three times as many negative ions as positive ions are released.

"Now," as pointed out by Professor Humphreys², "a strong upward current of air is one of the most conspicuous

features of the thunderstorm. It is always evident in the turbulent cauliflower heads of the cumulus cloud, the parent, presumably, of all thunderstorm. Besides, its inference is compelled by the occurrence of hail, a frequent thunderstorm phenomenon, whose formation requires the carrying of rain-drops and the growing hailstones repeatedly to cold and therefore high altitudes. And from the existence of hail it is further inferred that an updraft of at least eight meters per second must often occur within the body of the storm, since, as experiment shows, it requires approximately this velocity to support the larger drops, and even a greater velocity to support the average hailstone.

“Experiment also shows that rain can not fall through air of ordinary density whose upward velocity is greater than about eight meters per second, or itself fall with greater velocity through still air; that in such a current, or with such a velocity, drops large enough, if kept in tact, to force their way down, or, through the action of gravity, to attain a greater velocity than eight meters per second with reference to the air, whether still or in motion, are so blown to pieces that the increased ratio of supporting area to total mass causes the resulting spray to be carried aloft or left behind, together with, of course, all original smaller drops. Clearly, then, the updrafts within a cumulus cloud frequently must break up at about the same level innumerable drops which, through coalescence, have grown beyond the critical size, and thereby according to Simpson’s experiments, produce electrical separation within the cloud itself. Obviously, under the turmoil of a thunderstorm, its choppy surges and pulses, such drops may be forced through the cycle of union (facilitated by any charges they may carry) and division, of coalescence and disruption, from one to many times, with the formation on each at every disruption, again *according to experiment*, of a correspondingly increased electrical charge. The turmoil compels mechanical contact between the drops, whereupon the charges break down the surface tension and insure coalescence. Hence, once started, the electricity of a thunderstorm rapidly grows to a considerable maximum.

“After a time the larger drops reach, here and there, places below which the up-draft is small—the air can not be rushing up everywhere—and then fall as positively charged rain,

because of the processes just explained. The negative electrons in the meantime are carried up into the higher portions of the cumulus, where they unite with the cloud particles and thereby facilitate their coalescence into negatively charged drops. Hence, the heavy rain of a thunderstorm should be positively charged, as it almost always is, and the gentler portions negatively charged which very frequently is the case.

"Such in brief, is Dr. Simpson's theory of the origin of the electricity in thunderstorms, a theory that fully accounts for the facts of observation and in turn is itself abundantly supported by laboratory tests and simulative experiments.

"If this theory is correct, and it seems well founded, it must follow that the *one essential* to the formation of the giant cumulus cloud, namely, *the rapid uprush of moist air*, is also the one essential to the generation of the electricity of thunderstorms. Hence the reason why lightning seldom if ever occurs except in connection with a cumulus cloud is understandable and obvious. It is simply because the only process that can produce the one is also the process that is necessary and sufficient for the production of the other."

4. *Turbulence of the Cumulus Cloud.*

That the large cumulus clouds, especially those that produce thunderstorms, are exceedingly turbulent within with violent vertical motion, as demanded by the theory just outlined, is evident to even the casual observer. Furthermore the testimony of those balloonists who have had the trying ordeal of passing through the heart of a thunderstorm confirms the facts of observation. Since these are the only clouds, apparently, characterized by this high degree of turbulence, it may be well to pause a moment and ask why these motions—motions which, in the magnitude of their vertical components and degree of turmoil, are never exhibited by clouds of any other kind nor are they met with elsewhere by either manned, sounding or pilot balloons. Without going into very great detail, it may be pointed out, as has been done by von Bezold⁴, that the heat liberated by the sudden condensation from a state of supersaturation, and also from the sudden congelation of undercooled cloud particles, would cause an equally sudden expansion of the atmosphere, resulting in turbulent motions analogous to those observed in the large cumulus clouds.

This, however, is not sufficient to account for all the observed facts, since it is not clear just how either the condensation or the congelation could suddenly take place throughout a cloud volume great enough to produce the observed effects. We must, therefore, look for some other explanation, and this we shall probably find, *in the difference between the actual temperature gradient of the surrounding atmosphere and the adiabatic temperature gradient of the saturated air within the cloud itself*; or, in other words, the cause of the violent up-rush and turbulent condition within large cumulus clouds is, presumably, the difference between the temperature of the inner or warmer portions of the cloud itself and that of the surrounding atmosphere at the same level.

5. Causes of Convectonal Instability.

As we have just tried to show the *sine qui non* of the thunderstorm is the *rapid* vertical convection of *moist air*; the up-rush must be *rapid* and the air must be *moist*; one without the other is not sufficient. We may have, for example, a *very* rapid convection over a desert region but there being no moisture there will be no cloud-formation and therefore no thunderstorm. On the other hand we may have air ever so humid but if the movement upward is too gentle not even a cloud may result, but if a cloud, certainly no thunderstorm. It is obvious, therefore, that we must have both "rapid convection" and "moist air."

This leads us to a consideration of the conditions under which the vertical temperature gradients necessary to this convection can be established. These conditions are, according to Prof. Humphreys, three in number, namely:

- (1) A strong surface heating, especially in regions of light winds.
- (2) The over-running of one layer of air by another at a temperature sufficiently lower to induce convection.
- (3) The under-running and consequent uplift of a saturated layer of air by a denser layer.

Of these three conditions, the first mentioned—"strong heating surfaces"—is, for obvious reasons, of most frequent occurrence over the land surfaces of the earth; number two is also of frequent occurrence on land and is, perhaps, well nigh the

sole cause of thunderstorms on the ocean. Number three is by far less frequently the cause of thunderstorms than the other two, for while the actual *under-running* is of rather frequent occurrence, it seems probable that only occasionally is the uplift of sufficient magnitude to cause a thunderstorm.

6. *Periodic Recurrence of Thunderstorms.*

Keeping in mind the conditions or factors absolutely essential to the formation of a thunderstorm, we are well prepared to consider, perhaps in a measure to anticipate, the periodic recurrence and distribution of thunderstorms, for while it is possible, of course, for a thunderstorm to occur on any day at any hour, yet the fact is, and for obvious reasons, the day has its period of maximum thunderstorm activity, the year its maximum period, and there is some evidence of irregular cyclic periods of maximum activity, each maximum depending upon the simple facts that the more humid the air and the more rapid the local vertical convections the more frequent and also the more intense the thunderstorms.

Taking the *day* as our unit, we find the period of maximum thunderstorm activity is not the same over the land as over the ocean. Vertical convection of the atmosphere over the land is most pronounced, of course, when the surfaces are most heated, namely, in the afternoons; hence the inland or continental thunderstorm occurs most frequently, in most places, between 2 and 4 P. M. Over the ocean, however, the temperature gradients that are most favorable for rapid vertical convection are most frequent during the early morning hours, and therefore thunderstorms usually occur on the ocean between midnight and 4 A. M. If we take the *year* as our unit, we find, for reasons that will readily occur to all, that thunderstorms are most frequent, over the land, when the surface heating is at a maximum, in middle latitudes in June and in the higher latitudes in July or August. Over the ocean, however, the thunderstorm is most frequent in the winter months.

Furthermore, since the thunderstorm is vitally associated with rainfall and high temperature, it must follow that a *cycle* of warm, wet years would give a maximum of thunderstorms and a cycle of cold, dry years a minimum.

We have the key to the *geographical* distribution of thunderstorms in the conditions essential to their production, and

while it is safe to say that the thunderstorm, in one form or another, does occur at some time or other in all parts of the earth, yet from what we know of the meteorological conditions ordinarily prevailing over the various portions of the earth, we are very sure that it is very rare over large areas and may never occur in some regions. In the United States⁵, for example, we find two centers of maximum thunderstorm activity, one over Tampa, Florida, and the other over Santa Fe, New Mexico. In the ten-year period, 1904-1913, 944 thunderstorms were recorded at Tampa and 710 at Santa Fe. Tampa is near sea-level and Santa Fe is about 7,000 feet above the sea.

7. Classification of Thunderstorms.

One is impressed with the very great variety and many variations met with in the study of these storms. This is true whether one is considering the attendant circumstances, the varying degree of intensity exhibited by them, the frequency of occurrence, the resulting effects, the distribution through the day, the year, or over the earth's surface, or whether one is considering the factors operating to produce and maintain these storms. Variety everywhere!

At one time, and not so long ago, it was thought that all thunderstorms were local phenomena and were therefore not subject to any general law. In an important sense the thunderstorm is a local phenomenon but the forces operating to produce many of them are far from local. It is now known that a majority of these storms travel in a definite direction and are therefore moving under a general law. In general, with respect to the producing causes or conditions out of which they grow, thunderstorms may be divided into (1) local or "heat" thunderstorms, and (2) the cyclonic thunderstorms, or "thundersqualls." Or, if we wish to be a little more exact or "scientific," we may follow Professor Humphreys and make five classes, namely, (1) the "heat" or local, (2) the cyclonic, (3) the tornadic, (4) the anti-cyclonic, and (5) the "border," thunderstorm. The significance of this classification will be pointed out later in connection with the illustrated portion of this lecture but it seems appropriate at this time to refer to Durand-Greville's famous theory of "the squall zone" in connection with cyclonic thunderstorms. He holds that "cyclonic thunderstorms"—and that means all except the "local" or

"heat" thunderstorm—are but an accessory result of a body of extremely complex phenomena—an organism someone has called it⁶—the *squall*, which is subject to fixed laws and forms an integral part of certain lows. This so-called "squall zone" in which, according to Durand-Greville⁷, nearly all "cyclonic" thunderstorms, or as he calls them, "thundersqualls," occur, starts some where near the center of the barometric depression or "low" and usually extends out to its boundary, thus having a length of a thousand miles or more, while its width may vary from 10 to 60 miles or more. This zone moves, advances or recedes, with the "low" of which it is a part, as a rule remaining parallel with itself. Should the "low" remain stationary, the squall zone may, and usually does, swing round the center. The passage of the "squall zone" over any given place, shown by the familiar "squall hook" of the barograph trace, is attended by the concomitant production of certain phenomena that occur only within the limits of the zone. They begin at the moment the "squall front" of the squall zone reaches the place of observation, they rapidly attain their maximum intensity, and then gradually weaken and finally die out as the rear of the zone passes and normal conditions become established. These accompanying phenomena may be more or less numerous, thus giving rise to a variety of "squalls," each characterized by its appropriate phenomena. These squalls have been classified by Durand-Greville as follows, viz.:

DURAND-GREVILLE'S CLASSIFICATION OF SQUALLS⁸

- | | | | | |
|---|-------------------|------------------|---------------------------------------|---------------------|
| 1. Sudden increase in
wind velocity..... | } White
squall | } Wind
squall | } Rain,
hail,
or
snow squall | } Thunder
squall |
| 2. Sudden change in
wind direction..... | | | | |
| 3. Sudden rise in
pressure..... | | | | |
| 4. Sudden fall in
pressure..... | | | | |
| 5. Sudden rise in
relative humidity..... | | | | |
| 6. Rapid increase in
cloudiness..... | | | | |
| 7. Downpours of
rain..... | | | | |
| hail..... | | | | |
| snow..... | | | | |
| 8. Lightning and thunder..... | | | | |

The basis of this classification is, as you see, increasing complexity. Note also that the phenomena observed during the passage of a squall are actually the results of two causes, one of these, the "squall wind," is purely *dynamic*, pre-existent, and may be of distant origin; the other is the local condition of the atmosphere and is *static*.

8. *The Mechanism of the Thunderstorm.*

Thus far we have considered the thunderstorm in a more or less general way—its definition, its causes, its recurrence, its distribution, its relation to areas of high and low pressure, etc. Let us now consider *a* typical thunderstorm in actual progress and note its mechanism and some of its more important phenomena. Just here the slide would be very helpful but we shall content ourselves just now with the bare mention of some of the things that one may look for in the well-defined thunderstorm. Among these may be mentioned the winds, the squall cloud, the pressure, the temperature, the humidity, the rain, the hail, the so-called "rain-gush," the rate of advance of the storm, the lightning, and the thunder.

First, the thunderstorm winds must be carefully considered if one is to understand fully the mechanism of the thunderstorm itself. As every one knows, as a thunderstorm approaches a given place the wind at that place is generally light and from a direction that carries it across the path of the approaching storm, that just before the rain begins the wind begins to die down, almost to a calm, and to change its direction. When this change is complete it blows for a few moments, rather gently, directly toward the nearest portion of the storm front, and finally as the rain is almost at hand, there is a sudden change of direction and the wind now comes, often in violent gusts, directly away from the storm and in the direction the storm is moving, a direction quite different from the original direction of the wind. As a rule these strong gusts of wind last through the early part of the storm only and then follow gentle winds again, at first following the storm but after an hour or so they blow from the same general direction as the original surface winds. Now, as we have tried to show, the thunderstorm is the child of a cumulus cloud and the cumulus cloud is the child of a vertical convection which results from a more or less super-adiabatic temperature gradient. This gradient

may be established in one of three ways, as above pointed out. Now, inasmuch as the passage of a cumulus cloud overhead, however large, so long as rain does not fall from it, does not materially disturb the surface winds, in other words, does not bring on any of the familiar gusts and other thunderstorm phenomena, we must infer that in some way the rain is an important factor both in starting and maintaining the winds we have just noted. On the other hand we cannot assume that the rain is the whole cause of these winds for they do not accompany other and ordinary showers, however heavy the rainfall.

The "rain-gush" or heavy downpour after a heavy clap of thunder has often been misunderstood and has been made to serve as a proof of the claims of the so-called "rain-makers." The fact is the rain is the cause of the thunder or lightning, and not the thunder the cause of the heavy rain.

Then there is the *lightning* in its various forms, the "streak" lightning, the so-called "rocker" lightning, the "ball" lightning; the "sheet" lightning, the "beaded" (?) lightning, the "return" lightning, and some people say the "dark" lightning, and so on. To discuss all these would carry us far beyond our limit. Then there is the question of the temperature along the path of a lightning discharge, how does the lightning render the atmosphere through which it passes luminous, etc. Perhaps no one knows the answer to these questions but it is very certain that the temperature along the path of the lightning discharge is very high from the fact that it sets fire to many objects, such as buildings, that fall within its path. Just how the lightning discharge renders its path through the atmosphere luminous is not definitely known. Of course it does make the air along its path very hot but no one so far as I know has ever succeeded by any ordinary means in rendering oxygen or nitrogen luminous by heating. It must be therefore, that the luminosity is due to something besides high temperature, probably, according to Prof. Humphreys, to "internal atomic disturbances induced by the swiftly moving electrons of the discharge." The spectrum reveals to us the interesting fact that lightning flashes are of two colors, white and pink or rose. The rose-colored flashes, when examined in the spectroscope, show several lines due to hydrogen, which of course are due to the decomposition of some of the water along the lightning path. The duration of

the lightning discharge is exceedingly variable, ranging from 0.0002 second for a single flash to, in rare cases, even a full second or more for a multiple flash consisting of a primary and a series of subsequent flashes. The lightning discharge is direct, not alternating, as shown by the fact that the lightning may operate telegraph instruments, may reverse the polarity of dynamos, both of which requires a direct current.

The length of the lightning streak also varies greatly. When the discharge is from cloud to earth the length is seldom more than 2 or 3 kilometers, but when from cloud to cloud may be 10 to 20 kilometers (6 to 12 miles). The path of the lightning discharge may extend from the cloud to earth, from one portion to another of the same cloud, or from one cloud to another cloud. Obviously the second case is of the most frequent occurrence, that is, from the upper to the lower portion of the same cloud; from cloud to earth is next in point of frequency, and from cloud to cloud, relatively rare. Sometimes the discharge from cloud to earth may include in its strange and tortuous path objects that have not sufficient conductivity to carry it and as a result of the sudden and excessive heating many very freakish things may be done, such as shingles blown off, chimneys shattered, trees stripped of their bark or splintered, wires fused, even holes melted through metal, etc. Then there are certain chemical reactions resulting from these electrical discharges that play an important part in the economy of nature. For instance the health-giving ozone of the atmosphere is greatly increased by the passage of a thunderstorm, and even the fertility of the soil may be increased by the production of considerable quantities of ammonia and soluble salts.

Perhaps, a word or two should be said regarding the *danger* to life incident to the passage of a thunderstorm. That there is danger, even great danger at times, is abundantly shown from the tragic statistics of deaths each year from this cause. While it is not possible, perhaps, to remove this danger, it is possible to reduce it, chiefly by avoiding the points of greatest danger. In general, it is safer inside than outside of a house, especially if the house has a well-grounded rod or metal roof; it is also safer in the valley than on a hill or elevated portion of land, this because the chance for a cloud-to-earth discharge varies inversely as the distance between them; it is also very unsafe to take refuge under a tree and the taller the tree the

greater the danger. No tree is immune but those trees having an extensive root system or a deep tap-root are most apt to be struck because they are the best grounded and therefore offer the least electrical resistance. Then again if one is caught out of doors and is exposed to a violent thunderstorm it is best so far as danger from lightning is concerned, to let one's clothes get soaking wet, because wet clothes are much better conductors and dry clothes much poorer conductors, than the human body. It might even be advisable to lie flat on the wet ground, undignified as this may be. For any given locality, the lower the cloud the greater the danger; hence, when the humidity is high it is favorable for a dangerous storm, since the cloud will form at a low level and the rain is apt to be very abundant. For the same reason a winter storm is likely to be more dangerous than a summer storm of equal intensity.

And now how do we account for the *thunder*—that particular feature that gives name to our storm? It has taken quite a while to answer this question satisfactorily. Many very silly theories still persist. The electrical discharge, the "lightning," furnishes the key to the explanation. The sudden and intense heating of the air along the path of the discharge causes it to expand suddenly and violently, sending out from every part of its path a steep compression wave, which, as we understand it, is the real cause of the thunder. The "rumbling" that sometimes follows is due, chiefly perhaps, to the inequality in the distances from the observer to the various portions of the lightning's path, to the crookedness of the path, to a succession of discharges, and to some extent to reflection under favorable conditions. The distance to which thunder may be heard varies from 7 to 15 miles.

9. *Forecasting the Thunderstorm.*

The forecasting of conditions favorable for the formation of thunderstorms one or two days in advance is comparatively easy but to say, even a few hours in advance, that a thunderstorm will occur at a given place, at or about a given time, is, to say the least, a hazardous venture. It is only after the storm has actually begun and its direction and rate of movement have been determined, can one speak with even a small degree of assurance. As every one knows, a storm may occur, in fact several of them, in sight of the observer and yet not at

the place of observation. Then besides the thunderstorm is of a very limited duration; it may, at the very most, last twenty-four hours, but as a rule a very few hours will exhaust it. It is only when this type of storm assumes the character of a tornado that knowledge of its approach becomes really important.

10. The Thunderstorm and Excessive Precipitation.

Another thing that gives to the thunderstorm economic importance is the fact that from 66 to 100 per cent of all instances of excessive precipitation in the United States occur as the result of or in connection with thunderstorms⁹. Some places, like Bismark, Denver and Sante Fe, excessive precipitation never occurs except in connection with thunderstorms. Furthermore, the records will show that practically all cases of remarkable downpours of rain or hail occur in connection with these storms.

II. THUNDERSTORMS IN OHIO.

1. Introduction.

Needless to say, the thunderstorms of Ohio do not differ in any essential respect from those we have been discussing. Our chief and perhaps only excuse for referring to them at this time and in this manner is to make an occasion to call the attention of the Academy to a piece of work accomplished in Ohio that, so far as we know, is the only one of its kind in this or any other country, namely an intensive study of thunderstorms over a limited region through a period of one year. The purposes were to determine as far as practicable the origin, the distribution, the number, the frequency, the extent of territory covered, the attending phenomena, etc., of these storms, and if possible, trace the history of each individual thunderstorm that entered or originated in the state of Ohio, during the year 1917.

2. The Plan.

Our plan was to secure at least one observer in each township in the State but as the work was to be purely gratuitous we were not able to interest one person in each of the 1357 townships. Our total enlistment was about 730 volunteer

observers, about 130 co-operative observers and the six regular Weather Bureau stations in the State. We also received some assistance from the telephone and telegraph companies in the State and even dealers in lightning rods.

3. *Forms and Instruction.*

Each observer was then supplied with full instructions and a suitable card on which to make his report of each storm. This form called for the exact date and time of the storm, the exact location of the observer, time first, loudest and last thunder was heard, direction the storm moved, time rain began and ended, time hail began and ended, direction of wind before and after the storm, etc. The weakness of the plan was, of course, in the fact that it was dependent upon voluntary service and as was to have been expected, some observers failed us at the critical moment, so that we were not always sure we had the complete history of each storm. However, we assembled quite a mass of thunderstorm data and these have been charted and otherwise prepared for publication.

3. *A Resume.*

Among the many interesting facts brought out in the special study of thunderstorms in Ohio during the year 1917, may be mentioned, briefly, the following:

(a) Thunderstorms in Ohio are incident to the *passage* of those cyclonic areas (see M. W. R., Supplement No. 1) that move directly over or just north of the State, and to the *approach* of those that move just south of the State. The first group includes the Alberta, the North Pacific, the Rocky Mountain and probably the Central and Colorado types; the second group includes the South Pacific and the Texas types, especially those that follow a northeasterly course.

The passage of the Alberta type, especially in the late winter or early spring months, will cause thunderstorms in Ohio when the wind-shift line, or "squall line," is pronounced, and extends in a north-south, or a northeast-southwest direction. These thunderstorms will set in slightly in advance of this line and will continue until it has passed. See weather map of January 31, 1917, 7 A. M. The passage of the North Pacific, the Northern Rocky Mountain, the Central, and the Colorado

types, will cause thunderstorms in Ohio only when an area of high pressure prevails over the eastern Lake Region or New England. See weather map of April 17, 1917, 7 A. M. As these types are usually followed by a high pressure area from the northwest of more or less intensity and therefore move with considerable rapidity, the thunderstorms incident thereto are apt to be of short duration and are seldom of a violent character.

But to the approach of the South Pacific and Texas types is to be attributed by far the greater portion of the thunderstorms in Ohio. These types prevail from early May into late October. As a rule thunderstorms will set in over the western part of the State when the center of the "low" reaches Missouri or southern Illinois and will probably become general over the State. These cyclonic types often bring thunderstorms of a very violent nature. When the "low" passes over the northwestern corner of the State, thus forcing the isotherms far northward of their normal position, and is followed by a "high" of moderate intensity, hailstorms are likely to occur with the shift of the wind—passage of the squall line—and subsequent increase in pressure. See weather maps of March 10 and 11, 1917. The position of the Atlantic high does not seem to have any material effect on the rain-producing characteristics of these "lows." When the path of these cyclonic types suddenly curves to the north and passes into the Lake Region from northern Indiana or Illinois, thunderstorms are likely to occur in Ohio both on the approach and the passage of these areas. Normally, however, their passage just over or just south of the State is followed by brisk westerly winds, clearing weather and falling temperature.

The East Gulf and South Atlantic types gave rise to no thunderstorms in Ohio during the year 1917.

(b) The data seem to show certain centers of maximum activity and storm-frequency. The southwestern part of the State is certainly the most favorable portion for the development of the tornado as all tornadoes of consequence in the history of the Bureau have occurred in that section.

(c) Thunderstorms were reported on 169 days, midnight to midnight. Of these 169 days, thunderstorms occurred in the forenoon only on 22 days, on the afternoon only on 80 days, on

both forenoon and afternoon on 63 days, on 9 days the storm began in the forenoon and ended in the afternoon, and on 2 occasions the storm began on the afternoon or evening of one day and ended in the early morning of the following day. Note that the afternoon thunderstorm is about four times as frequent as the forenoon, that the number of days with thunderstorms both morning and afternoon is quite large, that the number of days on which the storm begins in the forenoon and continues into the afternoon is quite small and the number beginning in the afternoon or evening and continuing beyond midnight is smaller still.

The reports further show that at least 31 persons were killed during the year by lightning, 70 others more or less injured; in addition, a large number of animals were killed and much property destroyed. We have no reliable figures as to how many times the lightning actually struck but we learn from the report of the State Fire Marshal that 215 fires were started during the year as the result of a lightning stroke, destroying property valued at about \$370,000. The 215 objects damaged or destroyed were classified as follows: 137 barns, 53 dwellings, 4 churches, 4 sheds, 4 warehouses, 2 haystacks, 2 oil tanks, 1 dry cleaning establishment, 1 hotel, 1 livery stable, 1 school house, 1 straw stack, 1 manufacturing establishment and 2 mercantile buildings. The Fire Marshal's office takes no note of lightning strokes that do not start a fire or cause the loss of human life. These fires were distributed through the months as follows, viz.: February, 5; March, 6; April, 5; May, 33; June, 27; July, 45; August, 66; September, 17; October, 11; January, November and December, *none*.

Another item of considerable interest, perhaps, is that about 95 per cent of the objects struck were wet at the time and rain was falling, leaving only about 5 per cent that were dry and struck when no rain was falling. In one case, the burning of a barn near Conneaut, Ashtabula County, March 26th, the report seems to indicate that snow was falling at the time of the stroke that caused the fire.

Another thing: The days on which thunderstorms are general over the State are relatively few. Of the 169 thunderstorm days in 1917, on 7 days only were thunderstorms general; on 11 days they covered about three-fourths of the State; on

23 days about one-half; on 17 days, nearly half the State; on the rest, they were local and limited.

As intimated above, the publication of this report (Thunderstorms in Ohio in 1917) has been and is being delayed on account of lack of the necessary funds.

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Univ. of Minnesota, Minneapolis, Minn.
- '94. STERKI, VICTOR, (F '21), *Conchology, Botany* New Philadelphia
- '03. STICKNEY, M. E. (F '20), *Botany* Denison University, Granville
- '22. STOCKDALE, PARIS B., *Geology* Dept. of Geology, O. S. U., Columbus
- '20. STONE, JULIUS F., *General Science* Grandview, Columbus
- '15. STOUT, HARRY O., *Botany, Geology, Agriculture, Zoology*
Bowling Green High School, Bowling Green
- '08. STOUT, W. E. (F '20), *Chemistry, Ceramics, Geology*
291 E. Northwood Ave., Columbus
- '20. STOVER, ERNEST L., *Botany*
Botany and Zoology Bldg., O. S. U., Columbus
- '09. STOVER, W. GARFIELD (F '20), *Botany, Plant Pathology*
O. S. U., Columbus
- '21. STRAUSBAUGH, P. D., *Botany, Microchemistry as applied to Plant
Physiology* Cleveland Road, Wooster
- '03. SWEZEY, OTTO H. 925 Twelfth Ave., Honolulu, Hawaii
- '19. TAYLOR, MRS. BAYARD, *Botany, Ornithology* West Jefferson
- '14. THAYER, WARREN N., *Geology*
Oil and Gas Section, Bur. of Int. Rev., 5013 Interior Bldg., Washington, D. C.
- '19. THOMAS, EDWARD S., *Ornithology* 81 Ruggery Bldg., Columbus
- '15. THOMAS, ROY C., *Botany, Zoology, Geology* Agr. Exp. Sta., Wooster
- '20. TIFFANY, LEWIS H., *Botany* Dept. of Botany, O. S. U., Columbus
- '21. TIPPPIE, WILLIAM A., *Physics* 2145 W. 100th St., Cleveland
- '20. TODD, FRANK E., *Entomology, Zoology, Plant Pathology*
Arizona Commission of Agriculture and Horticulture, Yuma, Arizona
- '94. TODD, JOSEPH H., *Geology, Archeology*
Christmas Knoll, Wooster
- '19. TOOPS, HERBERT A., *Psychology*
Teachers' College, Columbia Univ., New York City
- '15. TRANSEAU, EDGAR N. (F '20), *Botany* O. S. U., Columbus
- '19. TRETTIEN, A. W., *Psychology* Toledo Univ., Toledo
- '12. TURNER, CLARENCE L. (F '20), *Zoology*, 550 E. Broad St., Beloit, Wis.
- '12. UNNEWEHR, EMORY C., *Physics* Baldwin-Wallace College, Berea
- '15. VAN CLEVE, M. R., *Physical Geography, Botany* 542 Ardin Place, Toledo
- '21. VAN HORN, FRANK R. (F '22), *Geology*
Case School of Applied Sci., Cleveland
- '15. VIVIAN, ALFRED (F '20), *Agriculture, Chemistry* O. S. U., Columbus
- '04. WAITE, F. C. (F '20), *Anatomy, Zoology* 1353 E. Ninth St., Cleveland
- '18. WALLER, A. E. (F '20), *Botany* O. S. U., Columbus
- '02. WALTON, L. B. (F '20), *Biology* Gambier
- '21. WATSON, A. C., *Psychology* 216 Fifth St., Marietta
- '21. WEBB, ROBERT FULTON, *Geology* Dept. of Geology, O. S. U., Columbus

- '98. WEBB, R. J., *Botany*.....Garrettsville
- '19. WEISS, ALBERT P. (F '20), *Psychology, Biology*.....O. S. U., Columbus
- '11. WELLS, B. W., (F '21), *Botany*.....
North Carolina Agricultural College, N. Raleigh, N. C.
- '13. WELLS, G. R. ('19; F '20), *Psychology*, Hartford Geol. Lab., Hartford, Conn.
- '22. WEMBRIDGE, MRS. ELEANOR, *Psychology*.....1681 Fulton Road, Cleveland
- '22. WEMBRIDGE, HARRY, *Psychology*.....1681 Fulton Road, Cleveland
- '91. WERNER, WILLIAM C. (*'22), *Botany*.....422 N. St. Clair St., Painesville
- '96. WERTHNER, WILLIAM B. (F '20), *Botany*.....1525 Riverside Drive, Dayton
- '01. WESTGATE, LEWIS G. (F '20), *Geology*.....Delaware
- '22. WHIPPLE, RALPH W. (*), *Geology, Paleontology, Anthropology*.....
Marietta College, Marietta
- '18. WICKLIFF E. L., *Zoology, Ornithology*.....
Dept. of Zoology and Entomology, O. S. U., Columbus
- '22. WILLARD, C. J. (*), *Agronomy, Botany*.....O. S. U., Columbus
- '21. WILLIAMS, R. D., *Philosophy, Psychology*.....
Dept. of Philosophy, O. S. U., Columbus
- '13. WILLIAMS, SAMUEL R. (F '20), *Physics*.....154 Forest St., Oberlin
- '03. WILLIAMS, STEPHEN R. (F '20), *Biology*.....300 E. Church St., Oxford
- '97. WILLIAMSON, E. B., *Entomology*.....Bluffton, Ind.
- '15. WITHROW, JAMES R. (F '20), *Chemistry, Mineralogy*...O. S. U., Columbus
- '20. WURDACK, MARY E., *Botany*.....29 Twelfth Ave., Columbus
- '03. YORK, HARLAN H., *Botany*...West Virginia Univ., Morgantown, W. Va.
- '21. YOUNG, HERMAN H., *Psychology, Educational Research*.....
Indiana Univ., Bloomington, Ind.
- '06. YOUNG, R. A., *Botany*.....120 Chestnut Ave., Takoma Park, D. C.

Total Membership—326

REPORT

OF THE

THIRTY-SECOND ANNUAL MEETING

OF

The Ohio Academy of Science

The Thirty-second Annual Meeting of the Ohio Academy of Science was held at Ohio State University, Columbus, April 14 and 15, 1922, under the Presidency of Professor Raymond C. Osburn. Eighty-seven members were registered as in attendance; forty-six new members were elected.

On invitation of the geologists of the Michigan Academy of Science, a number of the members of the Geological Section of the Ohio Academy, under the Vice-Presidency of Professor Kirtley F. Mather, participated in a joint field meeting, held June 3 and 4, for the study of the glacial geology and Silurian rocks of Southeastern Michigan and adjoining portions of Ontario. The party was under the leadership of Mr. Frank Leverett, of the University of Michigan, and Professor W. H. Sherzer, of the Michigan State Normal College. Professor J. E. Carman, of Ohio State University, collaborated in directing the investigations at certain localities.

GENERAL PROGRAM.

FRIDAY, APRIL 14.

- 9:30 A. M.—Business Meeting.
- 11:00 A. M.—Reading of Papers in General Session.
- 12:30 P. M.—Luncheon.
- 2:00 P. M.—Demonstrations.
- 2:30 P. M.—Joint session with the Ohio State University Chapter of Sigma Xi; Illustrated Lecture by Professor L. R. Jones, of the University of Wisconsin, on "Disease and Disease Resistance in Plants."
- 3:30 P. M.—Reading of Papers in Sectional Meetings.
- 6:00 P. M.—Dinner.
- 7:30 P. M.—Address by the President of the Academy, Professor Raymond C. Osburn, Ohio State University, on "Some Common Misconceptions of Evolution."
- 9:00 P. M.—Adjourned Business Meeting.

SATURDAY, APRIL 15.

- 9:00 A. M.—Adjourned Business Meeting.
 10:00 A. M.—Illustrated Lecture by Professor Dayton C. Miller, Case School of Applied Science, on "Ether-Drift Experiments at Mount Wilson, California."
 11:00 A. M.—Reading of Papers in General Session.
 12:30 P. M.—Luncheon.
 2:00 P. M.—Demonstrations.
 2:30 P. M.—Reading of Papers in Sectional Meetings.

SATURDAY, JUNE 3, and SUNDAY, JUNE 4.

Joint Excursion of Section for Geology, with Geologists of Michigan Academy of Science.

MINUTES OF BUSINESS MEETINGS.

The first business session was called to order by President Osburn at 9:30 A. M., on Friday, April 14. Adjourned sessions were held after the presidential address on Friday evening and at 9:00 A. M. on the following day.

The appointment of the following committees for the meeting was announced by the chair:

Committee on Membership—A. P. Weiss, W. G. Stover, F. C. Blake.

Committee on Resolutions—S. I. Kornhauser, Stephen R. Williams, L. G. Westgate.

Committee on Necrology—G. D. Hubbard, Herbert Osborn, F. L. Landacre.

The following Auditing Committee was elected by the Academy: M. E. Stickney, F. L. Landacre.

The following Nominating Committee was elected by the ballot of the Academy: W. M. Barrows, W. G. Stover, G. D. Hubbard, Alpheus W. Smith, F. L. Landacre, H. E. Burr.

Report of the Secretary.

The following report by the Secretary was received and ordered filed.

April 4, 1922.

To the Ohio Academy of Science:

The work of the Secretary for the year has been largely routine, but a few items are of some general interest.

A brief report of the Thirty-first Annual Meeting was prepared for *Science*, and appeared in the issue for September 23.

The Secretary was present to represent the Academy at the meetings of the Council of the American Association for the Advancement of Science, held in connection with the Toronto meeting.

The blank form for nomination of fellows was prepared, as directed, and mailed to all members in connection with the preliminary announcement of this meeting. The certificate of election to fellowship is in preparation; a proof was submitted to the Executive Committee for suggestion and criticism at the meeting of April 13.

The following letter was received from the Wisconsin Academy of Science, Arts and Letters:

Sept. 15, 1921.

The Secretary, Ohio Academy of Science, Columbus, Ohio.

MY DEAR SIR: We take great pleasure in sending to your institution, under separate cover, the bronze medallion issued in 1920 in commemoration of the fiftieth anniversary of the founding of the Wisconsin Academy, 1870-1920.

We ask you to accept it with our fraternal greetings.

A brief description of the medallion, with a short statement of its significance, is sent with the medallion itself. A fuller account is printed in the Fiftieth Anniversary volume, Volume XX of the Transactions of the Academy.

Yours very truly,

CHANCEY JUDAY, *Secretary.*

The medallion was duly acknowledged, and has been placed with the archives of the Academy in the Library Building.

A letter from V. A. Latham, corresponding secretary of the State Microscopical Society of Illinois, contains the following sentences, asking for the co-operation of members of the Academy:

"Is there any one you know of who might have duplicates of Scientific Journals, especially Microscopy? We are anxious to complete ours and the John Crerar Library, and any help through your Academy would be appreciated. We had so many former micro-workers in your state who were members." Dr. Latham may be addressed at 1644 Morse Ave., Rogers Park, Chicago.

Several years ago the Secretary suggested the desirability of concentrating the administrative work of the Academy in Columbus by the election of a Columbus man as secretary. This suggestion may well be repeated at this time. The increase in membership, the organization of new sections, and the affiliation with the American Association for the Advancement of Science have so materially increased the routine work of the secretary and treasurer that the Academy should look forward in the very near future to the organization of a regular Academy headquarters in Columbus, with salaried secretary and treasurer, or, probably better, a secretary-treasurer, for efficiency would be conserved in various ways by the combination of the two offices. This matter is further considered in the report of the Executive Committee.

Respectfully submitted,

EDWARD L. RICE, *Secretary.*

Report of the Treasurer for the Year 1921-1922.

The report of the Treasurer was received as follows and referred to the Auditing Committee whose report is appended.

Balance in Hayden-Clinton Bank March 17, 1920, as previously reported.. \$515.74
 Received from C. W. Reeder, Librarian, for 1920-1921 sales of publications 12.95
 Received from members for dues to A. A. A. S. and the Ohio Academy.. 1,174.10

Total.....\$1,702.79
 Less checks.....1,085.27

Balance in Bank April 12, 1921..... \$617.52

The Disbursements have been as follows:

To E. L. Rice for Secretarial expenses.....\$ 37.81
 To L. H. Tiffany for expenses of Business Manager..... 5.00
 To Eunice Evans for assistance for the Treasurer..... 7.75
 To Postmaster, Columbus, for letter-head envelopes..... 19.46
 To Independent Print Shop..... 30.75
 To Spahr & Glenn..... 101.00
 To B. E. Livingston for dues for members of the A. A. A. S..... 633.50
 To L. H. Tiffany for the Ohio Journal of Science..... 250.00

Total.....\$1,085.27

CR.

Balance carried forward.....\$ 515.74
 Cash deposited.....1,187.05

\$1,702.79

DR.

As itemized expenditures.....\$1,085.27
 Balance in hand..... 617.52

There has been received from C. W. Reeder \$37.00 for 1921-1922 sale of publications of the Ohio Academy of Science, which is not included in the account as given.

Below is the statement of the Manager of Ohio Journal of Science, Mr. L. H. Tiffany, which your Treasurer desires to have included in this report, feeling that the members of the Academy are entitled to know the present financial status of the Journal.

FINANCIAL STATEMENT OF OHIO JOURNAL OF SCIENCE.
 (Volume XXI, 1920-21. The Ohio Journal of Science.)

Receipts—

Balance from J. S. Hine, 1920-21.....\$ 19.15
 Separates from Vol. XXI 286.91
 Extra copies of "Journal"..... 9.10
 Subscriptions to Vol. XXI..... 16.00
 Ohio State Univ. Annual Allowance..... 500.00

Total Receipts..... \$831.16

Expenditures:

Bucher Engr. Co., plates, half-tones, etc.....\$127.50
 Spahr & Glenn, printing..... 500.00
 Postage and express..... 60.82
 Envelopes, bill heads, etc..... 7.90

Total expenditures..... \$696.22

Balance on hand, 1920-21..... \$134.94

Cost of printing "Journal".....	\$830.25
Cost of printing separates.....	252.00
Total printing cost.....	\$1,082.25
Total cost of printing.....	\$1,082.25
Paid on account.....	500.00
Unpaid.....	\$582.25
Balance on hand.....	134.94
Deficit for 1920-21.....	\$447.31

The deficit indicated for 1920-1921 for the Ohio Journal of Science has been partially relieved by the payment of \$250. This is the amount derived from the dollar of the individual membership fee toward the upkeep of the Journal, as provided for in the Constitution of the Ohio Academy of Science. It should be noted that this is the amount derived from membership dues for 1921-1922 and advanced to the Business Manager, in order that he might pay current expenses. As more dues are paid, more money will be advanced, but your Treasurer is not empowered to advance more than the amount allowed by the Constitution. He feels that definite measures should be provided for permanently relieving the embarrassment of the Ohio Journal of Science, which has been and is well managed and has only fallen into debt because of the rising costs of publication. The Journal has a large and growing circulation and is a medium for the communication of papers of the members of the Academy within the State and abroad. It offers rather prompt publication, a desideratum well worth considering in these days of over-crowded journals, many of which face a more serious deficit than our own.

There are two proposals which the Treasurer desires to offer as a means of removing the deficit of the Journal. They are both temporary relief measures. The first is that money be advanced from the Research Fund. This is the more attractive proposal, because the product of scientific research must sooner or later be communicated to some scientific audience. The research fund is open to members of the Academy who desire aid for the completion of their studies. It would be of aid to the worker and his audience alike, if the fund should be drawn upon to remove the deficit of the Journal.

The second proposal is that the Treasurer be empowered to remove the deficit. This has the objection that the measure amounts to the equivalent of increasing, to the subscriber, the cost of the Journal, even though this increase be a temporary one. It is to be distinctly understood that the Treasurer is opposed to any permanent increase in the cost of the Journal. The Editor, Dr. F. H. Kreckler, has the problem of keeping up the standard of the Journal at the least cost, and has not indicated that the price of the Journal to subscribers is too low. The two proposals are placed before the Academy with the request that action be taken.

In the meantime an active campaign for more funds should be carried on. An increase in the number of members is greatly desired. An

appeal for individual help for the Journal from persons interested in its welfare and for an increased subsidy from the Ohio State University have both been suggested. No definite action has been taken on these suggestions as yet.

A. E. WALLER, *Treasurer.*

The financial portion of the above report has been examined and found correct.

M. E. STICKNEY,
F. L. LANDACRE,
Auditing Committee.

Report of the Executive Committee.

The report of the Executive Committee was received as follows and ordered filed.

April 14, 1922.

To the Ohio Academy of Science:

The Executive Committee has met twice since the last Annual Meeting of the Academy. At the first meeting, December 17, Messrs. R. C. Osburn, Waller, Alexander and Rice were present, with Professor Herbert Osborn as guest; at the second meeting, last evening, all members of the Committee were in attendance. Several matters of business have also been handled through correspondence.

That the date of the Annual Meeting was set for April 14 and 15, in Columbus, is already sufficiently well known.

Dean George F. Arps was appointed Vice-President for Psychology, to succeed Professor Rudolph Pintner, resigned.

Twenty-nine applications for membership have been approved during the year, subject to ratification by the present meeting.

A communication was received from Arthur MacDonald, under date of October 11, 1921, urging the adoption of a resolution calling upon Congress to concentrate "the scientific bureaus of the Government under the jurisdiction of the Board of Regents of the Smithsonian Institution, with the view to developing Government science to the highest possible efficiency, by affording scientific workers permanent tenure of office, greater freedom in investigation, non-interference of politics, and adequate salaries." Your Committee deemed it unwise to commit the Academy to this policy.

The Committee recommends that the Academy take action urging upon the colleges of Ohio the desirability of a uniform spring vacation, to facilitate for instructors the attendance upon the meetings of the Academy and other professional societies composed wholly or in considerable part of college men.

The Committee recommends the amendment of Chapter 1, Section 1, of the By-laws by the addition of the clause: "members who have paid regular dues in the Academy for twenty-five years shall also be classed as life members, and shall be relieved of further financial obligations."

The Executive Committee has considered the desirability of modifications of the status of the secretary and treasurer of the Academy in line with the suggestions of the Secretary's report. Such readjustments may make desirable the combination of the two offices and the addition to the Executive Committee of a third elective member. In order that such action may be possible at the next annual meeting, in case it is deemed desirable, the Committee desires that this report be considered as notification of proposed amendment of the constitution. The Committee further recommends the reference of the entire matter to the incoming Executive Committee for further consideration and report.

Respectfully submitted,

EDWARD L. RICE, *Secretary,*
For the Committee.

Report of the Publication Committee.

The following report of the Publication Committee was received and ordered filed.

The Annual Report of the Thirty-first Meeting, Proceedings, Vol. VII, Part 6, contained 54 pages, including the President's address, which also appeared in the November, 1921, number of the Ohio Journal of Science.

It is recommended that beginning with this year the President's address shall be published in the Ohio Journal of Science as soon after the Annual Meeting as possible, that it shall not be offered for publication elsewhere until it has appeared in the Journal and that it shall not be published in the Annual Report.

It is further recommended that the Secretary's report shall be published in the Ohio Journal of Science in the summer or autumn, so that the Annual Report can be printed in December.

It seems desirable also to publish any special address, delivered on invitation before the Academy, in the Ohio Journal of Science.

Since the membership of the Academy is increasing rapidly it is the intention of the publication committee to print 750 copies of the Annual Report and of any special papers, instead of 500 as heretofore.

Respectfully submitted,

JOHN H. SCHAFFNER, *Chairman.*

Report of the Library Committee.

The following report of the Library Committee was received and ordered filed.

April 14, 1922.

To the Ohio Academy of Science:

The Library Committee begs leave to submit the following report:

1. The annual report of the Thirty-first meeting of the Academy, held in 1921, was published in the Ohio Journal of Science for November,

1921, and later reissued with additions as part six of volume seven of the *Proceedings of the Academy*. Copies of this number were mailed to every person on the membership list, and to the seventy-one scientific societies on the exchange list.

2. The sale of publications during the year has been above the average, the amount received being \$37.00. This sum has been turned over to the treasurer.

3. Since the members of the Academy are interested in the development of library resources in the natural sciences, the Committee wishes to take this opportunity to call attention to several very notable additions to the collections of the Ohio State University Library made during the year:

- (a) Academie des Sciences (Paris) *Memoires*, 1666-1770.
- (b) Academie Imperiale des sciences de Saint Petersbourg *Memoires et bulletin*. Complete to date.
- (c) K. Akademie der Wissenschaften (Vienna) *Denkschriften philosophisch-historische Klasse*, v. 1-62, 1850-1918.
Sitzungsberichte philosophisch-historische Klasse, v. 1-180, 1847-48—1915-16.
The Library already owns the *Denkschriften* and *Sitzungsberichte* of the *Mathematisch-naturwissenschaftliche Klasse*.
- (d) *Annales des sciences naturelles, zoologie et botanique*, 1824-1908 in 316 volumes. (This is one of the three complete sets in the United States).
- (e) *Biologia Centrali—Americana*; or, Contributions to the knowledge of the fauna and flora of Mexico and Central America; ed. by F. D. Godman and Osbert Salvin, 63 v. 1879-1915.
- (f) *Journal of Botany, British and foreign*, v. 1-46, 1863-1908.
- (g) *Linnean Society of London, Transactions*, 1791-1916, 55 vols.
- (h) *Societe d'anthropologie de Paris, Bulletin*, 57 vols. 1860-1915.
- (i) *Zoological Society of London. Transactions*, v. 1-20, 1833-1915.

Needless to say, all members of the Academy are welcome, not only to the use of these new sets, but also to all the sources in the scientific field which are owned by the University Library.

Very respectfully,

C. W. REEDER,
For the Committee.

Report of the Trustees of the Research Fund.

The following report of the Trustees of the Research Fund was received and ordered filed. The financial portion of the report was referred to the Auditing Committee, whose report is appended.

To the Ohio Academy of Science:

The Trustees of the Research Fund of the Academy submit the following report for the period from March 1st, 1921, to March 28th, 1922.

RECEIPTS.	
Cash on hand March 1, 1921, as per last report.....	\$870.90
Check from Mr. McMillin.....	250.00
Interest on Liberty Bonds.....	25.50
	\$1,146.40
EXPENDITURES.	
Paid on grants:	
Nov. 30, 1921, Paul B. Sears.....	\$ 6.20
Feb. 14, 1922, James S. Hine.....	50.00
	\$56.20
ASSETS.	
Cash on hand March 28, 1922.....	\$1,090.20
Liberty Bonds at par.....	600.00
	\$1,690.20
LIABILITIES.	
Grants: Paul B. Sears.....	\$ 46.36
L. B. Walton.....	100.00
W. H. Bucher.....	25.00
	\$171.36
Excess of cash assets over liabilities.....	\$918.84

Two or three recent applications for grants are under consideration. Vouchers and receipts for the verification of this report are submitted herewith.

Respectfully,

T. C. MENDENHALL,
HERBERT OSBORN,
GEORGE D. HUBBARD,
Trustees.

Examined and found correct.

M. E. STICKNEY,
F. L. LANDACRE,
Auditing Committee.

Report of the Committee on Legislation.

The Committee on Legislation reported that no further action had been taken since the last annual meeting, but recommended that the committee be continued with a view to presenting desired legislation to the next General Assembly.

Report of the Committee on State Parks and Conservation.

In an oral report of progress, the chairman of the Committee, Professor Herbert Osborn, mentioned the great advance that has been made in the acquisition of protected tracts by the Division of Fish and Game of the State Department of Agriculture and by the State Forester, and emphasized the cordial attitude of these officers toward the permanent preservation of the native fauna and flora of these tracts. He also called attention to the very valuable list of Ohio areas desirable for preservation compiled by Dr. E. Lucy Braun, representing the Ecological Society of America, and urged the co-operation of the Academy membership in the extension of this list by the report of additional interesting localities.

Director Taber, of the State Department of Agriculture, was invited by the committee to address the Academy, and spoke very interestingly of the present condition of the tracts owned and leased by the State as game preserves and the plans of the Department for their development and control. He expressed a keen interest in the preservation of all forms of native plant and animal life in these tracts and the desire that the Academy assist, through its Committee on State Parks and Conservation and its individual membership, by the suggestion of desirable tracts and control measures.

On his own request, Professor M. M. Metcalf was excused from the committee, and Professor E. R. Hayhurst elected in his place. The committee now consists of Herbert Osborn, chairman, J. E. Carman, E. R. Hayhurst, F. H. Herrick, C. G. Shatzer, E. N. Transeau.

The following recommendations of the committee were approved by the Academy:

1. That the Committee on State Parks and Conservation be made a standing committee, and that the details concerning time of service and future elections be referred to the Executive Committee.
2. That the Academy favors the establishment of a State Commission on Parks and Conservation, composed of one representative each for the Division of Fish and Game of the State Department of Agriculture, the Division of Forestry of the Ohio Experiment Station, the State Board of Public Works, the State Archeological Society, the State Geological Survey, and the State Board of Health, and two representatives for the Ohio Academy of Science—one a botanist and one a zoologist.

3. That the duties of this commission shall include the following: To advise and co-operate in the selection of tracts desirable for state parks, forests, game refuges, and scientific reservations; to formulate regulations as to the manner in which such tracts may be used for recreational, historic, refuge, scenic, scientific, or other purposes; and to inaugurate measures for the most efficient development of the various tracts for the purposes agreed upon.

The Academy further voted to suggest that the committee consider the advisability of employing a salaried officer to promote conservation work in Ohio.

Election of Officers.

The following officers and committee members for 1922-23 were elected by the ballot of the Academy.

President—Professor A. P. Weiss, Ohio State University, Columbus.

Vice-Presidents:

Zoology—Professor C. G. Rogers, Oberlin College, Oberlin.

Botany—Dr. E. Lucy Braun, University of Cincinnati, Cincinnati.

Geology—Professor K. F. Mather, Denison University, Granville.

Physics—Professor R. C. Gowdy, University of Cincinnati, Cincinnati. (Professor Gowdy declined the vice-presidency, and Professor Alpheus W. Smith, Ohio State University, was appointed by the Executive Committee to fill the vacancy).

Medical Sciences—Professor C. F. Spohr, Ohio State University, Columbus.

Psychology—Dr. H. H. Goddard, Ohio Bureau of Juvenile Research, Columbus.

Secretary—Professor E. L. Rice, Ohio Wesleyan University, Delaware.

Treasurer—Dr. A. E. Waller, Ohio State University, Columbus.

Elective Members of Executive Committee—Professor R. C. Osburn, Ohio State University, Columbus; Professor Lynds Jones, Oberlin College, Oberlin.

Member of Publication Committee—Professor H. C. Sampson, Ohio State University, Columbus.

Trustee of Research Fund—Professor G. D. Hubbard, Oberlin College, Oberlin.

Member of Library Committee—Mr. C. W. Reeder, Ohio State University, Columbus.

Representatives on Editorial Board of Ohio Journal of Science:

Zoology—Professor R. A. Budington, Oberlin College, Oberlin.

Botany—Professor Bruce Fink, Miami University, Oxford.

Geology—Professor G. D. Hubbard, Oberlin College, Oberlin.

Physics—Professor S. J. M. Allen, University of Cincinnati, Cincinnati.

Medical Sciences—Professor F. C. Waite, Western Reserve University, Cleveland.

Psychology—Professor H. A. Aikins, Western Reserve University, Cleveland.

Election of Members.

The Membership Committee reported seventeen names for election to membership; twenty-nine additional names, previously approved by the Executive Committee and marked with (*) in the following list, were presented for ratification. All were elected, as follows:

*ALLEN, WILLIAM RAY; Zoology, Ecology, Municipal University of Akron, Akron.

*AUTEN, MARY; Zoology, Entomology, Botany; Botany and Zoology Bldg., Ohio State University, Columbus.

*AXEL, ROBERT; Psychology; 980 Clinton St., Bronx, New York, N. Y.

*BARINGER, JOHN W.; Plant Pathology, Botany; Dept. of Botany, Ohio State University, Columbus.

BULGER, J. W.; Entomology, Plant Pathology, Zoology; Dept. of Zoology and Entomology, Ohio State University, Columbus.

*CONREY, G. W.; Geology; Soils Dept., Ohio State University, Columbus.

ELWOOD, P. H.; Landscape Architecture; Ohio State University, Columbus.

*ESPER, ERWIN A.; Psychology; Ohio State University, Columbus.

*FARNSWORTH, PAUL R.; Psychology; 128 W. Tenth Ave., Columbus.

*GORDON, ROBERT B.; Botany, Ornithology; 478 W. Seventh Ave., Columbus.

GOSSARD, H. A.; Entomology, Zoology; Wooster.

*HALSTED, FRANCES J.; Psychology, Physiology; 1 Thirteenth Ave., Columbus.

*HARTMAN, GRACE L.; Botany, Physiology; 1868 Rosalind Ave., East Cleveland.

*HATCH, ELIZABETH M.; Psychology; 9 Twelfth Ave., Columbus.

HOSKINS, R. G.; Physiology; 710 N. Park St., Columbus.

*HUMPHREY, SYLVESTER S.; Botany, Plant Pathology; Dept. of Botany, Ohio State University, Columbus.

*ISRAEL, HAROLD; Psychology; 22 Fifteenth Ave., Columbus.

*KLECKNER, M. E.; Chemistry; Heidelberg University, Tiffin.

*KOCH, BERTHE COUCH; Psychology; 303 Whittier St., Columbus.

LEE, M. O.; Zoology; Dorset.

MCCORMICK, ROBERT N.; Zoology; 161 W. Tenth Ave., Columbus.

*MCGLENCHAY, CHLOIE D.; Psychology; 52 Pacemont Road, Columbus.

*MADISON, HAROLD L.; Botany, Zoology; 2289 Grandview Ave., Cleveland Heights.

*MANLEY, R. M.; Physics, Chemistry, Structure of Universe; 738 Schofield Bldg., Cleveland.

MARQUART, J. ROGER; Zoology, Botany; 900 N. Limestone St., Springfield.

MYER, BERNARD S.; Botany; Dept. of Botany, Ohio State University, Columbus.

- NEISWANDER, CLAUD R.; Zoology; Rawson.
- *PARROT, G. H.; Biology, Geology, Physics; 41 E. Eighth Ave. Columbus.
- *PETERS, HAROLD S.; Ornithology, Botany; 150 W. Fourth Ave., Columbus.
- *POLKOWSKI, ANNA; Psychology; 52 Pacemont Road, Columbus.
- *PRESSEY, MRS. LUELLA W.; Psychology; Apt. 18, Indianola Courts, 1778 N. High St., Columbus.
- *PRESSEY, SIDNEY L.; Psychology, Psychiatry; Dept. of Psychology, Ohio State University, Columbus.
- RAUP, HUGH M.; Zoology, Botany; 1815 N. Fountain Blvd., Springfield.
- RUNNELLS, HARMON A.; Botany; Botany Dept., Ohio State University, Columbus.
- SECREST, EDMUND; Forestry; Ohio Experiment Station, Wooster.
- SETTERFIELD, HUGH; Zoology, Botany; Myers Hall, Springfield.
- SISSON, SEPTIMUS; Veterinary Medicine, Anatomy; Ohio State University, Columbus.
- SMITH, ALPHEUS W.; Physics; Ohio State University, Columbus.
- SMITH, ALVA W.; Physics; Ohio State University, Columbus.
- SMITH, RUSSELL M.; Chemistry, Botany; 69 Neal Ave., Newark.
- *SPENCER, HERBERT; Entomology, Zoology, Ecology; Botany and Zoology Bldg., Ohio State University, Columbus.
- *STAUFFER, A. S.; Botany; 220 S. Main St., Ada.
- *STOCKDALE, PARIS B.; Geology; Dept. of Geology, Ohio State University, Columbus.
- *VAN HORN, FRANK R.; Geology; Case School of Applied Science, Cleveland.
- *WEMBRIDGE, MRS. ELEANOR; Psychology; 1681 Fulton Road, Cleveland.
- *WEMBRIDGE, HARRY; Psychology; 1681 Fulton Road, Cleveland.

Report of the Committee on Election of Fellows.

The following report of the Committee on Election of Fellows was accepted and ordered filed.

April 14, 1922.

To the Ohio Academy of Science:

A meeting of the Committee on Election of Fellows was held on the evening of April 13th. Five of the joint committee were present; four were represented by duly authorized proxies; two were absent without representation, although the proxy of one arrived just after the close of the meeting.

Sixteen nominations were received by the committee. In the consideration of these nominations the committee was guided by the principles laid down last year—that members should not be elected to fellowship until one year, at least, after election to membership, and that resident members should not be elected to fellowship who are not showing an active interest in the work of the Academy.

Eleven of the nominees received the necessary nine votes (unanimous for those present at the meeting), and were duly elected to fellowship. The newly elected fellows will receive personal notification, and the list will be published in the Annual Report.

EDWARD L. RICE, *Secretary,*
For the Committee.

The list of members elected to fellowship is as follows:

ANNETTE F. BRAUN	KIRTLEY F. MATHER
E. E. CLAYTON	SUSAN P. NICHOLS
W. C. DEVEREAUX	BRADLEY M. PATTEN
HENRY H. GODDARD	JASPER D. SAYRE
CLARENCE H. KENNEDY	ALPHEUS W. SMITH
FRANK R. VAN HORN	

Report of the Committee on Resolutions.

The following message and resolutions were presented by the Committee on Resolutions and adopted by the Academy. The message was transmitted to Mr. McMillin in a night letter, and reached him on his seventy-eighth birthday, April 16, the day after the Academy meeting. Mr. McMillin's reply follows the telegram.

(1) Message to Mr. Emerson McMillin, Darlington, N. J.

The Ohio Academy of Science in its thirty-second annual meeting in Columbus desires to extend to you on the occasion of your seventy-eighth birthday its heartiest congratulations, and wishes to express to you its appreciation of your continued support of scientific research through the Academy.

REPLY OF MR. McMILLIN.

DARLINGTON, MAHWAH, NEW JERSEY, April 18, 1922.

DEAR MR. SECRETARY:

Your telegram conveying the Birthday Greetings of the Ohio Academy of Science was received on time, and was the best tonic I have received during the last fifteen months of almost continuous illness. I do thank you and the Academy most sincerely.

EMERSON McMILLIN.

EDWARD L. RICE, *Secretary.*

(2) The Ohio Academy of Science wishes to express to the Local Committee and to the authorities of Ohio State University its appreciation for the hospitality extended to the Academy on the occasion of its thirty-second annual meeting.

(3) The Academy wishes to thank Dr. L. R. Jones for his interesting and instructive address on "Disease and Disease Resistance in Plants" delivered before the Academy.

(4) To Dr. Dayton C. Miller the Academy wishes to express its thanks for his stimulating address on "Ether-Drift Experiments at Mount Wilson, California."

S. I. KORNHAUSER,
S. R. WILLIAMS,
For the Committee.

Report of the Committee on Necrology.

The following report of the Committee on Necrology was adopted by the Academy and ordered filed.

BIOGRAPHICAL SKETCH OF GEORGE FREDERICK WRIGHT

By GEORGE D. HUBBARD,*
Oberlin, Ohio.

In the passing of Professor George Frederick Wright a long life of active, productive work has closed and there goes from our midst one who has been an example and an inspiration to us all. Dr. Wright was born in Whitehall, New York, January 22nd, 1838. His death occurred on April 20th, 1921, of heart failure following influenza. He came of sturdy New England Puritan stock. On his mother's side, the family had been on American soil since 1640; on the father's side perhaps equally long. Mr. Wright's father was a farmer, and this son, one of a large family, acquired his early education in the local schools. At the age of seventeen he had gone as far as the district school could take him, and went out to teach a term in the only kind of school he knew.

It was in 1855, while still only seventeen, that he made the long journey from the old family home at Whitehall to the little college of Oberlin. Four years were spent in the undergraduate course and three in the theological seminary. These seven years came at a time in the history of Oberlin, as well as of the nation, when the social and even the political order trembled, and great questions were before the people. Mr. Wright found Oberlin a splendid place in which to feel his way in the discussion and solution of theologic, scientific, social and political questions, and he always took an intelligent part in such activities. These seven years not only gave him his college and seminary course, but laid the foundations for his future career. They brought out many of the qualities that were subsequently to give him the place he took in the world.

His first public service was a ten-year pastorate of the Congregational Church at Bakersfield, near St. Albans, in northwestern Vermont. His next residence was nearly an equal period at Andover, Massachusetts, as pastor of the Free Church, a residence which threw him in close contact with the stimulating faculty of Andover Theological Seminary. The friendships and intercourse of this period proved of very great value in Mr. Wright's life work. Not only did he meet the men of the Andover faculty, but he came in close contact with scholars of Boston, New Haven, and New York, to whose influence he readily responded. From Andover he was called to Oberlin in 1881 to become

*The author is quite unfamiliar personally with all of Professor Wright's experience save the last fifteen years, but is very happy to have known him so well in these later years. Owing to this lack of first hand information, extensive and frequent use has been made of life sketches prepared for other purposes, even to the borrowing of phrases and sentences. Credit and thanks are hereby given for all.

professor of New Testament Language and Literature in the theological seminary. Eleven years later, through the interest and generosity of a friend who established a chair for the purpose, Prof. Wright was made head of the department of The Harmony of Science and Revelation. In 1907 he reached the retiring age and became Emeritus Professor in the same chair until his death. Thus he had twenty years of pastoral work, twenty-six years of seminary teaching and fourteen years as Emeritus Professor.

When Mr. Wright began his first pastorate he set apart his mornings for scientific study, and they were as carefully preserved for that work as any student preserves his best hours to prepare for his class work. Part of his time was given to field work, a considerable portion to translation from Greek and German, work which greatly increased his proficiency in foreign languages. His studies took him through much theological and scientific literature, among which was Darwin's "Origin of Species." He did very little writing for publication until he entered the second pastorate at Andover, but here the papers began to come at frequent intervals. A few dealt with glacial problems, many with theologic and philosophic questions, and even here there began the long series of papers which came from his pen expressing his belief that there was nothing in science to hinder one's faith in God, Jesus and miracles. Although a strong champion of the theory of evolution, he was also a firm believer in evangelical Christianity. He believed in applying pragmatic tests to Christianity as much as to scientific truth, and this, much to the advantage of both. His scientific studies confirmed his religious conviction and theological conclusions. Open to truth from any source, research or revelation, he believed that no truth could be contradictory, since all was God's, whether expressed in His works or word.

While Prof. Wright's scientific training was very meagre, his scientific interest was always to the front. The home of his first pastorate was on a sand plain with esker and kame connections. This was in the days when the glacial theory for the drift had only begun to make its way. Mr. Wright studied his immediate environment until he became certain that it was the work of a sub-glacial stream. His residence at Andover was also on a prominent glacial feature known as Indian Ridge. It had been popularly attributed to the work of the Indians, but Mr. Wright thought differently and in 1873 in the Bulletin of the Essex Institute he published his first geologic paper. It covered only three or four pages, but it interpreted the ridge as wholly of glacial origin and predicted the finding of its continuation for many miles to the north. His paper inspired observers, and within a few months he had several invitations to visit localities in line with Indian Ridge. These he followed up and established the explanation which he had suggested.

These early radical interpretations of the drift and of many of its forms earned the approval of Asa Gray and Clarence King, and this placed Wright's work in the front rank. He collaborated later with J. P. Leslie and with H. C. Lewis, of the Pennsylvania Geologic Survey

and with G. H. Cook, of the New Jersey Geologic Survey. He traced the moraines and ancient ice borders across New Jersey, Pennsylvania, Ohio, Indiana, Illinois, mostly in the eighties, and published in 1890 Bulletin 58 of the U. S. G. S., summarizing his results. In later years he studied glaciers and the products of their work in Alaska, Greenland, the British Isles, Holland, Belgium, and France, and journeyed completely across Siberia and Russia in his quest for glacial phenomena. These researches gave him the basal material upon which he built the superstructure which made him one of the first men of his age in glaciology.

His field studies were not confined to the work of glaciers, for from the earliest to the end, he was intensely interested in the remains of man that he found associated with the drift. This material was sought and found in many places where he studied the drift itself. Nor did such interest and research stop with man and the drift, for he has been an archeologist in all his travels in Italy, Greece, Palestine, in the region east of the Caspian and in his long journey to Siberia, as well as in the classic fields of western Europe. One of his books deals with the ice age in North America; another, the antiquity of man, and a third, man and the glacial period. These two lines of research were inseparably connected.

While his ministry covered but twenty years and his educational work technically but twenty-six, his research work covered his whole life. His educational work began with the district school before he came to college, was continued in several terms of vacation teaching while in college, and was taken up in his own seminary about twenty years after his graduation. Many of those who were in his classes or knew him as a teacher speak of his kindness of heart, breadth of scholarship, and, above all, his keen interest in the students. He was always looking for the best in them, suggesting lines of work for which he thought they were adapted, and was continually rejoicing in the successes of young people whom he knew.

The second professorship at Oberlin which was given to Prof. Wright in the seminary was established by a friend of the institution who stipulated that the holder should teach but half the year and travel the other half. It was this arrangement which opened up to Mr. Wright the opportunity of travel in Europe in 1892, Greenland in 1894, and his round-the-world trip in 1900-1901. In this latter trip, covering nearly 30,000 miles, he sailed from the United States west coast and after spending some time in Japan, visited Vladivostok and Manchuria, Peking and Kalgan, and made the long journey by rail across Siberia to Irkutsk. From here he journeyed southward and westward through Merv and Samarkand, crossing the Caspian to Tiflis and the Caucasus Mountains, and then proceeded to Constantinople, Palestine, Egypt and southern Europe.

On this trip he was royally received in Japan and Russia, and gave a number of lectures in several places. In fact, Prof. Wright has always had the ability to give an entertaining, inspiring and instructive

address. No record of his platform performance has been found, but it is well known that he was always sought for public addresses on all kinds of occasions, both in his home town and far away. Within a few months of his death he spoke to a learned audience for an hour perfectly logically and without notes. He seemed to have the faculty of marshalling in his public addresses a wealth of information, all organized and laid away for any sudden emergency. While not eloquent, he spoke with convincing directness and clearness. His hearers knew he was thoroughly convinced of what he said. He never trifled with an audience, but took them fully into his confidence.

As an author and publisher Mr. Wright achieved more than many men who do nothing else. His published papers number some five hundred and fifty and his volumes sixteen, some of which were translated into foreign languages, and at least one copyrighted in England. His "Ice Age in North America" has been through six editions and is considered a standard work in its field. Other books have been through more than one edition. His "Story of My Life and Work," published in 1916, sums up many of the conclusions in science and theology which he had reached through his years of study and thought. It also gives a fairly complete bibliography of his papers, the first of which is entitled "Ground of Confidence in Inductive Reasoning," and appeared in 1871, when he was thirty-three years old. But four titles more appear in the next four years; then they come faster, and eight or ten, sometimes fifteen a year flow from his facile pen. Not a year passed but saw papers or book reviews added to his voluminous bibliography, and the last paper was prepared during his last sickness, which was on him for some thirty days.

Beside the papers and books which he prepared for the press himself, he was editor and really the life and heart of the magazine "Bibliotheca Sacra" for thirty-eight years, beginning in 1883. In the year 1900, he with two or three other men in Washington founded a second magazine, "Records of the Past," which continued for twelve years, and then after the publication of a very complete index, was merged in another magazine.

In music, too, he had an active interest. A member of the Oberlin Musical Union for almost forty years, he sang in many oratorio concerts. He brought back and put into shape for American use a number of Russian songs, and was one of three active editors for a very excellent church hymnal.

A cursory glance through the list of his papers reveals the marvelous range of his studies—apologetics, religion, theology and philosophy, politics, history, and biography, commerce, geography, travel, and aesthetics, besides his two great fields of glaciology and archeology. Some of his papers were conciliatory, some controversial; a few were critical, most of them constructive.

Professor Wright was fraternal in spirit and delighted in the fellowship and stimulus of co-workers, yet he has never amassed memberships in learned societies. His affiliations were as follows:

Fellow, American Association for the Advancement of Science.

Fellow, Geological Society of America.

Boston Society of Natural History.

Fellow, Essex Institute.

Ohio Archeologic and Historical Society, (Pres., 1908).

Fellow, Ohio Academy of Science, (Pres., 1899).

In later years he has been unable to attend our meetings annually, but his presence was always profitable and stimulating to the Academy.

Prof. Wright was many-talented, and hence many sided in his interests and pursuits. The amount of his work reveals both his unusual capacity for turning it off and his great intellectual ability. He had a mind in rare degree persistently active, versatile and productive, and he succeeded in gaining interesting and notable attention to his writings and lectures in these many fields, because he made real contributions at many points and always had an attractive way of stating his conclusions.

In his writing and public utterance he vigorously defended his conclusions, not from pride or love of controversy, but because he believed in them and because his conscience would not let him do otherwise. Whether in his familiar surroundings or in strange lands far afield, he was alert and resourceful, companionable and appreciative. No one can say that Professor Wright slighted or mistreated him or intentionally misjudged him. He was quiet, unobtrusive, but genial, winsome, and broad-minded. His clear-cut features, gracious dignity, and unfailing courtesy always made him a distinguished figure in whatever group he stood. He was sympathetic and straight-forward, simple and direct as a child in all his dealings with his fellow men, so guileless that he often could be imposed upon. He was honest and conscientious to the last degree himself and was loathe to believe anyone could be otherwise.

He was deeply religious by nature, a believer in reason in religion, and faith in science, and out of this combination came his power to make his greatest contributions to the thought of his generation. Buoyant and hopeful, always looking forward, his life was full of happiness and achievement, and ran strong to the end. He was the same companion, whether in the privacy of his own home or on a difficult field trip or in a formal public gathering. As he will be missed in scientific and theologic circles, so will he be missed at home in the community for which he always thought and worked. Such a man could not fail to be an inspiration and a tower of strength to his fellows who were permitted to know him.

CHARLES BROOKOVER.

By HERBERT OSBORN AND FRANCIS L. LANDACRE.

(This sketch was not presented at the meeting, but prepared later for publication in the Proceedings.)

In the death of Professor Charles Brookover, which occurred at Louisville, Kentucky, March 17, 1922, the Ohio Academy has lost one of its distinguished members, one who for many years was associated in the scientific and educational work of the state and contributed worthily to the academy.

He was born in Adams County, Ohio, March 11, 1870, and obtained his collegiate education at Ohio University, at Athens, obtaining the degree of B. Ped. and M. S. from that institution. He carried graduate work at Columbia University and University of Chicago, receiving his Ph. D. degree from the latter institution in 1910. He taught in Colorado College, Buchtel College at Akron, Medical Department of University of Arkansas, and in the University of Louisville, Louisville, Kentucky. Especially while at Akron, where he taught from 1901 to 1913, he was active in the scientific work of the state, attended our meetings with great regularity and was particularly active in the entertainment of the Academy at its Akron meeting in 1910. He spent a number of summers at the Lake Laboratory and was one of the most esteemed members of the staff, serving as Acting Director during the summer of 1914. He was a man of high ideals and a most cheerful, helpful disposition, and his death is mourned by a host of intimate friends and scientific associates.

His research work was largely upon neurology of the lower vertebrates; and in this field he was a recognized authority. His papers, while not numerous, were always thorough and conscientiously worked out. Very little if any, of his work will need revision. He was cautious about propounding hypothesis and always preferred to accumulate a mass of carefully verified facts and then leave the ultimate interpretation to some one else. He was not timid in drawing conclusions, but realized fully that the great need, especially in comparative neurology, is a large body of well established facts from which, finally, safe conclusions may be drawn. He was quite willing to contribute less than his colleagues provided that his contributions could be considered safe and as far as possible, final. What he might have done if he had been in robust health is uncertain. With a serious handicap in health, however, his contributions, especially to comparative neurology, are notable and a matter of pride to his friends and colleagues.

Amendment of Constitution.

ART. VI, SECTION 1. *Annual Meeting.* Amended to read: The date and place of the annual meeting shall be fixed by the executive committee, subject to such instructions as shall be determined by the Academy at the preceding annual meeting, and shall be announced by circular at least thirty days before the meeting. The details of the daily session of each meeting shall be arranged by the program committee and announced in the official program immediately before the meeting.

Amendment of By-Laws.

CHAPTER VI, SECTION 4. *Annual Report.* Amended to read: The Annual Report of the Academy, including list of officers, list of members, secretary's report of the annual meeting, and such other matter as the publication committee may determine, shall be printed as a separate issue by the publication committee.

CHAPTER VI, SECTION 7. *Publication of President's Address and Other Addresses.* New section, to read: The President's address shall be published in the Ohio Journal of Science as soon as possible after the annual meeting, and shall not be published in another scientific magazine until it has appeared in the Journal. Other addresses delivered before the Academy on invitation may be published in the Ohio Journal of Science.

Support of Ohio Journal of Science.

A detailed statement of the financial status of the OHIO JOURNAL OF SCIENCE is included in the report of the treasurer. The question of an additional temporary subsidy to the JOURNAL on the part of the Academy, to relieve the present deficiency, was referred to the executive committee with power.

Scientific Sessions.

The complete scientific program of the meeting follows:

PRESIDENTIAL ADDRESS.

Some common misconceptions of evolution.....RAYMOND C. OSBURN

PUBLIC LECTURES.

Disease and disease resistance in plants.....L. R. JONES

Ether-drift experiments at Mount Wilson, California.....DAYTON C. MILLER

PAPERS.

1. Some proposed state parks for Ohio. (15 min.).....J. ERNEST CARMAN
2. Segregation and man. (15 min.).....MAYNARD M. METCALF
3. American biological stains for microscopical preparations. (10 min.),
S. I. KORNHAUSER
4. Further studies in the cytology of *Anisolabis*. (10 min.) (Lantern),
S. I. KORNHAUSER
5. Notes on tropical photography. (5 min.).....WILLIAM RAY ALLEN
6. Some unsolved problems in tidal zone ecology. (By title).....Z. P. METCALF
7. Preliminary survey of certain aquatic habitats on the Bass Islands.
(20 min.) (Lantern).....F. H. KRECKER
8. Some results from a pure-line isolation culture of *Euglena gracilis* Klebs.
(5 min.).....W. J. KOSTIR
9. A source of material for study of parasites. (5 min.)..MAYNARD M. METCALF
10. Specific names for parasites. (5 min.).....MAYNARD M. METCALF
11. Studies of the biology of freshwater mussels. (15 min.)..WILLIAM RAY ALLEN
12. The relationship of the Syngnathidae. (15 min.).....JAMES E. KINDRED
13. A quarter century of bird migration at Oberlin. (30 min.).....LYNDS JONES
14. A case of unhindered growth of the incisor teeth of the woodchuck.
(10 min.) (Lantern).....STEPHEN R. WILLIAMS
15. A cicindelid from Lake Bennett, British Columbia. (10 min.)..LYNDS JONES
16. Factors influencing reproduction in the cucumber beetle (*Diabrotica vittata* Fabr.) (10 min.).....W. V. BALDUF
17. Distribution and control of two important grape insects. (10 min.)
(Lantern).....D. M. DELONG
18. A study of the distribution of the leafhoppers of Presque Isle, Pa. (5 min.)
(Lantern).....D. M. DELONG
19. Emergence of a subimago Mayfly. (5 min.).....F. H. KRECKER
20. Some factors which have limited and directed insect evolution. (20 min.),
CLARENCE H. KENNEDY
21. Insect parasites and predators in spider's nests. (5 min.).....MARY AUTEN
22. The inter-relation of the Hessian fly (*Phytophaga destructor*) and one
of its parasites. (5 min.).....T. H. PARKS
23. Biological significance of the endocrines. (20 min.).....A. B. FLOWMAN
24. The effect of formaldehyde on the vitamins of milk. (5 min.),
A. M. BLEILE and R. J. SEYMOUR
25. Variation in the dandelion and some of its causes. (15 min.).....P. B. SEARS
26. A forest map of the Erie basin. (15 min.).....P. B. SEARS
27. The distribution of flowering plants on the smaller islands of Lake Erie.
(10 min.).....MALCOLM E. STICKNEY
28. The sexual nature of vegetative or dichotomous twins of *Arisaema*.
(15 min.).....JOHN H. SCHAFFNER
29. Influence of length of daylight on sex reversal in hemp. (15 min.),
JOHN H. SCHAFFNER
30. Some root and stem rots of clover in Ohio. (10 min.)..SYLVESTER S. HUMPHREY
31. Mosaic disease of tomato. (10 min.) (Lantern).....RAYMOND A. DOBBINS
32. Energy relations of plants. (15 min.).....E. N. TRANSEAU
33. Ecological distribution of grasses of North America. (15 min.)..E. L. STOVER
34. The algal food of fishes. (15 min.).....L. H. TIFFANY
35. Seedling blights of corn. (15 min.).....WILMER G. STOVER
36. The course of a plant disease. (15 min.).....WILMER G. STOVER
37. Extension work in plant pathology with special reference to the control of
corn and potato diseases. (20 min.).....E. E. CLAYTON

38. Barberry eradication in Ohio. (15 min.).....J. W. BARINGER
39. A study of variation in *Russula*. (5 min.).....H. C. BEARDSLEE
40. Geologic control of river navigation in northeastern Bolivia. (10 min.)
(Lantern).....KIRTLEY F. MATHER
41. The gorges of the Yangtze Kiang. (20 min.) (Lantern).....GEORGE D. HUBBARD
42. An inter-glacial gorge at Youngstown, Ohio. (12 min.).....G. F. LAMB
43. New points in the geology of Kelleys Island. (10 min.).....MILDRED FISHER
44. Some new data concerning the Bellefontaine outlier. (10 min.),
CLARENCE F. MOSES
45. The Pottsville formation of Ohio. (15 min.).....HELEN MORNINGSTAR
46. The Bainbridge caves. (10 min.).....ROBERT F. WEBB
47. The formation of box canyons in sandstone. (20 min.) (Lantern). J. E. HYDE
48. Mineralization along the dikes of southern Vermont. (15 min.),
HARRIET G. BRAY and ALDEN E. EMERY
49. The Wheeler National Monument. (15 min.) (Lantern).....ROBERT F. WEBB
50. Colloids in geologic problems. (20 min.).....GEORGE D. HUBBARD
51. Dynamics of the lithosphere. (25 min.).....O. C. JONES and GEORGE D. HUBBARD
52. Drainage changes north of Lake Superior. (15 min.) (Lantern),
ROBERT F. WEBB
53. The Arctic as one of the centers of distribution of early Paleozoic faunas,
AUGUST FOERSTE
54. Meanders of Rio Securé and Rio Mamoré, Bolivia. (10 min.) (Lantern),
KIRTLEY F. MATHER
55. Iron molding sands of Ohio. (15 min.).....J. A. BOWNOCKER
56. Report on the Edward Orton Memorial Library. (5 min.).....J. A. BOWNOCKER
57. New fish remains from northwestern Ohio. (15 min.).....J. ERNEST CARMAN
58. Some fossils from the Sylvania sandstone. (10 min.).....J. ERNEST CARMAN
59. Type specimens of fossils in the geological museum at Ohio State Uni-
versity. (5 min.).....HELEN MORNINGSTAR
60. Stylolites: their nature and origin. (15 min.).....PARIS B. STOCKDALE
61. A mounted topographic map of Ohio. (5 min.).....G. W. CONREY
62. Notes on the Cincinnati.....W. H. SHIDELER
63. Forecasting the weather in the Ohio Valley. (20 min.),
WILLIAM C. DEVEREAUX
64. The electron theory of metals. (15 min.).....ALPHEUS W. SMITH
65. The effect of a unidirectional field upon alternating current permeability
and energy loss in iron. (15 min.).....ALVA W. SMITH
66. Infra-red absorption bands as a means of determining molecular prop-
erties. (15 min.).....ERWIN F. LOWRY
67. Certain aspects of the problem of the static versus the dynamic atom.
(15 min.).....F. C. BLAKE
68. The study of "illumination" in physics courses. (15 min.).....F. C. CALDWELL
69. Some interesting pictures in infra-red.....YALE ROOTS
70. Duriron—a product of Ohio industry. (35 min.) (Lantern).....JAMES WITHROW
71. A case of dual personality. (20 min.).....HENRY H. GODDARD
72. The field of psychology. (15 min.).....B. H. BODE
73. The theory of differential education as applied to the handicapped
pupils in the elementary grades. (15 min.).....J. E. W. WALLIN
74. Qualitative clinical tests and psychological theory. (15 min.).....H. B. ENGLISH
75. Psychic complexes. (15 min.).....A. W. TRETTIEN
76. A comparison of initial and subsequent examinations of the same indi-
vidual by the same psychological methods. (15 min.).....MABEL R. FERNALD

DEMONSTRATIONS.

1. (a) Common mole (*Scalopus aquaticus machrinus* Rafinesque) "embalmed."
(b) Internal parasites of same.....F. A. HANAWALT
2. Tracheation of *Lestes* nymph.....CLARENCE H. KENNEDY
3. A plerocercoid (larval) tapeworm from the liver of the squirrel—exter-
nally segmented.....STEPHEN R. WILLIAMS
4. The head of the woodchuck described in Paper 14.....STEPHEN R. WILLIAMS
5. Types of tomato mosaic.....RAYMOND A. DOBBINS
6. Seedling blights of corn.....WILMER G. STOVER
7. Stalactites in glacial sand and recent conglomerates from Canton, Ohio,
G. F. LAMB
8. Illumination charts.....F. C. CALDWELL

PROCEEDINGS
OF THE
OHIO
ACADEMY OF SCIENCE

AFFILIATED WITH THE
AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE

VOLUME VII, PART EIGHT

Annual Report
Thirty-Third Meeting

ANNUAL REPORT
OF THE
OHIO ACADEMY OF SCIENCE

Thirty-Third Meeting

1923

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Incorporated 1892

Affiliated with the American Association for the Advancement of Science

PUBLICATION COMMITTEE

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Charleston School, Lorain
- '09. LAMB, G. F. (F '20), *Geology*.....233 Hartshorn St., Alliance
'14. LAMBORN, HELEN MORNINGSTAR (F '20), *Geology*, O. S. U., Columbus
'19. LAMPE, LOIS, *Botany*.....Dept. of Botany, O. S. U., Columbus
'96. LANDACRE, F. L. (F '20), *Zoology*.....O. S. U., Columbus
'22. LEE, M. O., *Zoology*.....Direct
'08. LIBRARY, OHIO STATE UNIVERSITY.....Columbus
'91. LLOYD, JOHN URI (F '20).....309 W. Court St., Cincinnati
'15. LORD, H. C. (F '20), *Astronomy, Mathematics*.....O. S. U., Columbus
'18. LOWRY, PHIL R., *Entomology, Zoology, Botany*.....
New Hampshire Agricultural Experiment Station, Durham, N. H.
'15. LUTZ, DEXTER, *Biology, Agriculture, Meteorology*.....
Pyongyang, Chosen, Japan
- '10. McAVOY, BLANCHE. *Biology*.....
Indiana State Normal School, Muncie, Ind.
'16. McCLOY, JAMES H., *Physics*.....Westerville

- '22. McCORMICK, ROBERT N., *Zoology*.....161 W. Tenth Ave., Columbus
- '23. McEWEN, ROBERT STANLEY, *Zoology*.....208 Forest St., Oberlin
- '22. MCGLENCHAY, CHLOIE D., *Psychology*.....52 Pacemont Road, Columbus
- '14. McPHERSON, WM. (F '20), *Chemistry*.....O. S. U., Columbus
- '22. MADISON, HAROLD L., *Botany, Zoology*.....
2289 Grandview Ave., Cleveland Heights
- '22. MANLEY, R. M., *Physics, Chemistry, Structure of Universe*.....
738 Schofield Bldg., Cleveland
- '21. MANSON, EDMUND S., JR., *Astronomy, Physics, Mathematics*.....
O. S. U., Columbus
- '10. MARK, CLARA GOULD (F '20), *Geology, Botany*.....
270 S. State St., Westerville
- '22. MARQUART, J. ROGER, *Zoology, Botany*...900 N. Limestone St., Springfield
- '19. MATEER, FLORENCE (F '21), *Psychology*...214 E. State St., Columbus
- '07. MATHER, KIRTLEY F. ('21; F '22), *Geology*...Denison Univ., Granville
- '23. MAY, CURTIS, *Botany*.....Dept. of Botany, O. S. U., Columbus
- '12. MENDENHALL, T. C. (F '20), *Physics*.....Ravenna
- '00. MERCER, W. F. (F '20), *Biology*.....Ohio University, Athens
- '09. METCALF, C. L. (F '20), *Entomology, Zoology*.....
Department of Entomology, Univ. of Illinois, Urbana, Ill.
- '08. METCALF, M. M. (F '20), *Zoology*.....Oberlin
- '03. METCALF, ZENO P., *Ornithology*.....State College Station, Raleigh, N. C.
- '14. METZGER, ALBERT C. D., *Chemistry, Ornithology, Geography*.....
380 Deshler Ave., Columbus
- '22. MEYER, BERNARD S., *Botany*...Dept. of Botany, O. S. U., Columbus
- '20. MILLER, DAYTON C. (F '20), *Physics*.....
Case School of Applied Science, Cleveland
- '98. MILLS, W. C. (F '20), *Archeology, Biology*.....Q. S. U., Columbus
- '20. MINCHIN, HOWARD D., *Physics*.....O. S. U., Columbus
- '18. MITCHELL, ROGER I., *Entomology*.....Sta. E, Route 6, Columbus
- '19. MITRA, SWARNA KUMER, *Botany*.....
Economic Botanist to Govt. of Assam, Sylhet, Assam, India
- '21. MOORE, DWIGHT M., *Botany*.....Granville
- '12. MORE, LOUIS T. (F '20), *Physics*.....Univ. of Cincinnati, Cincinnati
- '91. MORREY, C. B. ('19; F '20), *Bacteriology*.....O. S. U., Columbus
- '21. MORSE, PAUL FRANKLIN, *Geology*.....
Mississippi Geolog. Survey, Jackson, Miss.
- '06. MORSE, W. C. (F '20), *Geology*, Dept. of Geology, Agricultural Coll., Miss.
- '91. MOSELEY, E. L. (F '20), *Zoology, Botany, Physiography*.....
State Normal College, Bowling Green
- '19. MOSHER, EDNA, *Entomology*...Univ. of New Mexico, Albuquerque, N. M.
- '13. MOTE, DON C. (F '20), *Zoology, Entomology*.....
Office of State Entomologist, Phoenix, Ariz.
- '21. MOXOM, WALTER J., *Meteorology, Physics, Psychology*.....
U. S. Weather Bureau Office, Dayton
- '21. MURCHISON, CARL, *Psychology*.....The Tallawanda, Oxford
- '21. MYERS, GARRY C., *Psychology*, Cleveland School of Education, Cleveland

- '15. NAPPER, CHARLES W., *Geology*Greenfield
- '22. NEISWANDER, CLAUD R., *Zoology*.....Rawson
- '05. NELSON, JAMES A. (F '20), *Zoology, Embryology*.....Mt. Vernon
- '09. NICHOLS, SUSAN P. (F '22), *Botany*.....39 N. Cedar St., Oberlin
- '21. NIEHAUS, WM. E., *Botany, Geology*.....320 Beech St., Berea
- '93. OBERHOLSER, H. C. (F '21), 2805 Eighteenth St., N.W., Washington, D. C.
- '99. ODENBACH, F. L., *Meteorology*.....St. Ignatius College, Cleveland
- '16. OKEY, CATHARINE W., *Anatomy, Zoology*
Western College for Women, Oxford
- '13. O'NEAL, CLAUDE E. (F '20), *Botany*.....95 Oak Hill Ave., Delaware
- '17. ORCUTT, RUTH, *Botany, Zoology*Granville
- '98. OSBORN, HERBERT (F '20), *Entomology, Zoology*....O. S. U., Columbus
- '96. OSBURN, RAYMOND C. (F '20), *Zoology, Ichthyology*.....
Botany and Zoology Bldg., O. S. U., Columbus
- '19. OTIS, CHARLES H. (F '20), *Botany*
Biological Laboratory, Western Reserve Univ., Cleveland
- '23. PAINTER, DONALD H., *Geology*.....318 Grand Ave., Dayton
- '18. PARKS, T. H. (F '20), *Entomology*
Botany and Zoology Bldg., O. S. U., Columbus
- '22. PARROT, G. H., *Biology, Geology, Physics*...41 E. Eighth Ave., Columbus
- '21. PATTEN, BRADLEY M. (F '22), *Zoology, especially Embryology*.....
1353 East Ninth St., Cleveland
- '21. PATTON, LEROY, *Geology*.....Muskingum College, New Concord
- '21. PETERS, HAROLD S., *Ornithology and Botany*...363 West Ninth Ave., Columbus
- '14. PHILLIPS, RUTH L., *Biology and Allied Sciences*, Western College, Oxford
- '22. PHILLIPS, T. G., *Chemistry, Botany*.....
Dept. of Agricultural Chemistry, O. S. U., Columbus
- '15. PLOWMAN, AMON B. (F '20), *Botany, Physiology, Zoology*.....
346 Crown St., Akron
- '22. PRESSEY, MRS. LUELLA W., *Psychology*.....
Apt. 18, Indianola Courts, 1778 N. High St., Columbus
22. PRESSEY, SIDNEY L., *Psychology*.....
Department of Psychology, O. S. U., Columbus
- '12. RANKIN, JOHN P., *Biology, Medicine*....St. Luke's Hospital, New York City
- '22. RAUP, HUGH M., *Zoology, Botany*,...1845 N. Fountain Blvd., Springfield
- '21. REA, PAUL M. (F '23), *Natural History Sciences, especially Zoology*,
The Cleveland Museum of Natural History, 2717 Euclid Ave., Cleveland
- '16. REEDER, C. W.....Library, O. S. U., Columbus
- '01. RICE, EDWARD L. (F '20), *Zoology*.....Delaware
- '19. RIDENOUR, ALICE LOUISE, *General Science*.....London
- '21. RILEY, C. L., *Biology, Geology*.....1226 Fourteenth St., N. W., Canton
- '14. ROBINSON, J. M., *Entomology*.....Auburn, Ala.
- '19. ROGERS, A. SOPHIE, *Psychology*....Dept. of Psychology, O. S. U., Columbus
- '13. ROGERS, CHARLES G. (F '20), *Physiology*.....378 Reamer Place, Oberlin
- '14. ROOD, ALMON N., *Botany*.....R. F. D. No. 2, Phalanx Station
- '21. ROOTS, YALE K., *Physics*.....553 N. Bever, Wooster

- '21. ROSS, HERBERT W., *Chemistry, Geology*
West Technical High School, Cleveland
- '00. ROUDEBUSH, LOWELL.....R. F. D. No. 3, New Richmond
- '22. RUNNELLS, HARMON A., *Botany*.....Botany Dept., O. S. U., Columbus
- '10. RUSH, R. C., *Conchology*.....Hudson
- '18. SAMPSON, HOMER C. (F '20), *Botany*.....O. S. U., Columbus
- '21. SAYRE, JASPER D. (F '22), *Botany*, Department of Botany, O. S. U., Columbus
- '97. SCHAFFNER, JOHN H. (F '20), *Botany*.....O. S. U., Columbus
- '13. SCHEAR, E. W. E., *Biology*.....107 W. Park, Westerville
- '07. SCHEFFEL, EARL R., *Geology*
Dept. of Geology, Univ. of West Virginia, Morgantown, W. Va.
- '19. SCHWEIKHER, F. P., *Nature Study, General Science, Agriculture, Botany, Zoology*.....1623 Compton Rd., Cleveland
- '16. SCOTT, ERNEST (F '20), *Pathology*, Medical College, N. Park St., Columbus
- '15. SEARS, PAUL B. (F '21), *Botany, Entomology*.....
Dept. of Botany, Univ. of Nebraska, Lincoln, Neb.
- '22. SECREST, EDMUND, *Forestry*.....Ohio Experiment Station, Wooster
- '91. SELBY, A. D. (F '20), *Botany*...Ohio Agricultural Exper. Station, Wooster
- '22. SETTERFIELD, HUGH, *Zoology, Botany*.....Myers Hall, Springfield
- '14. SEYMOUR, RAYMOND JESSE (F '20), *Physiology, Zoology, Botany*...
Dept. of Physiology, O. S. U., Columbus
- '12. SHADLE, ALBERT, *Zoology*.....
Dept. of Biology, Univ. of Buffalo, Buffalo, N. Y.
- '11. SHARP, MRS. KATHARINE DOORIS, *Botany, Geology*.....London
- '08. SHATZER, C. G. (F '20).....1003 Woodlawn, Springfield
- '13. SHIDELER, W. H. (F '20), *Geology*.....Miami University, Oxford
- '10. SHILLIDAY, C. L., *Zoology*.....Gettysburg, Pa.
- '15. SHUMAN, S. C., *Botany*.....Boughtonville
- '13. SHUMAN, W. L., *Botany*South Euclid
- '22. SISSON, SEPTIMUS, (F '23), *Veterinary Medicine, Anatomy*.....
O. S. U., Columbus
- '21. SKAGGS, ERNEST B., *Psychology*.....
Dept. of Psychology, Univ. of Michigan, Ann Arbor, Mich.
- '19. SKINNER, CHARLES R., *Physics*.....334 N. Sandusky St., Delaware
- '12. SMITH, ALPHEUS W. ('22; F '22), *Physics*.....O. S. U., Columbus
- '22. SMITH, ALVA W., *Physics*.....O. S. U., Columbus
- '08. SMITH, ARTHUR L., *Geology*.....Valley Crossing
- '21. SMITH, ELLA THEA, *Botany, Zoology*.....P. O. Box 7, Salem
- '21. SMITH, ERNEST RICE, *Geology, Paleontology*.....
628 E. Walnut St., Greencastle, Ind.
- '22. SMITH, RUSSELL M., *Chemistry, Botany*.....69 Neal Ave., Newark
- '02. SNYDER, F. D., *Zoology, Ethnology*.....Ashtabula
- '22. SPENCER, HERBERT, *Entomology, Zoology, Ecology*.....
Truck Crop Exp. Station, Box 881, Norfolk, Va.
- '18. SPOHR, CARL F. (F '20), *Medical Sciences*. Medical Dept., O. S. U., Columbus
- '12. STANLEY, CLYDE M., *Zoology*.....Damascus
- '21. STAUFFER, A. S., *Botany*.....University High School, Chicago, Ill.

- '05. STAUFFER, CLINTON R. (F '20), *Geology*.....
Univ. of Minnesota, Minneapolis, Minn.
- '94. STERKI, VICTOR, (F '21), *Conchology, Botany*.....New Philadelphia
- '03. STICKNEY, M. E. (F '20), *Botany*.....Denison University, Granville
- '22. STOCKDALE, PARIS B., *Geology*...Dept. of Geology, O. S. U., Columbus
- '20. STONE, JULIUS F., *General Science*.....Grandview, Columbus
- '15. STOUT, HARRY O., *Botany, Geology, Agriculture, Zoology*.....
Bowling Green High School, Bowling Green
- '08. STOUT, W. E. (F '20), *Chemistry, Ceramics, Geology*
291 E. Northwood Ave., Columbus
- '20. STOVER, ERNEST L., *Botany*
Botany and Zoology Bldg., O. S. U., Columbus
- '09. STOVER, W. GARFIELD (F '20), *Botany, Plant Pathology*.....
O. S. U., Columbus
- '21. STRAUSBAUGH, P. D., *Botany, Microchemistry as applied to Plant Physiology*Cleveland Road, Wooster
- '03. SWEZEY, OTTO H.925 Twelfth Ave., Honolulu, Hawaii
- '23. SWINNERTON, ALLYN C., *Geology*.....Antioch College, Yellow Springs
- '19. TAYLOR, MRS. BAYARD, *Botany, Ornithology*.....West Jefferson
- '11. THAYER, WARREN N. (F '23), *Geology*
Oil and Gas Section, Bur. of Int. Rev., 5013 Interior Bldg., Washington, D.C.
- '19. THOMAS, EDWARD S., *Ornithology*.....81 Ruggery Bldg., Columbus
- '15. THOMAS, ROY C. (F '23), *Botany, Zoology, Geology*, Agr. Exp. Sta., Wooster
- '20. TIFFANY, LEWIS H. (F '23), *Botany*...Dept. of Botany, O. S. U., Columbus
- '21. TIPPPIE, WILLIAM A., *Physics*.....2145 W. 100th St., Cleveland
- '20. TODD, FRANK E., *Entomology, Zoology, Plant Pathology*.....
Arizona Commission of Agriculture and Horticulture, Yuma, Arizona
- '94. TODD, JOSEPH H., *Geology, Archeology*.....Christmas Knoll, Wooster
- '19. TOOPS, HERBERT A., *Psychology*.....
Teachers' College, Columbia Univ., New York City
- '15. TRANSEAU, EDGAR N. (F '20), *Botany*.....O. S. U., Columbus
- '19. TRETTIEN, A. W., *Psychology*.....Toledo Univ., Toledo
- '12. TURNER, CLARENCE L. (F '20), *Zoology*...Beloit College, Beloit, Wis.
- '12. UNNEWEHR, EMORY C., *Physics*.....Baldwin-Wallace College, Berea
- '15. VAN CLEVE, M. R., *Physical Geography, Botany*...542 Ardin Place, Toledo
- '21. VAN HORN, FRANK R. (F '22), *Geology*.....
Case School of Applied Sci., Cleveland
- '23. VAN HORN, JESSE LOWER, *Chemistry, Physics*.....
1490 Roycraft Ave., Lakewood
- '15. VIVIAN, ALFRED (F '20), *Agriculture, Chemistry*.....O. S. U., Columbus
- '04. WAITE, F. C. (F '20), *Anatomy, Zoology*....1353 E. Ninth St., Cleveland
- '18. WALLER, A. E., (F '20), *Botany*.....O. S. U., Columbus
- '02. WALTON, L. B. (F '20), *Biology*Gambier
- '21. WATSON, A. C., *Psychology*.....216 Fifth St., Marietta
- '21. WEBB, ROBERT FULTON, *Geology*...Dept. of Geology, O. S. U., Columbus
- '98. WEBB, R. J., *Botany*.....Garrettsville

- '19. WEISS, ALBERT P. (F '20), *Psychology, Biology*.....O. S. U., Columbus
- '11. WELLS, B. W. (F '21), *Botany*.....
North Carolina Agricultural College, Raleigh, N. C.
- '13. WELLS, G. R. ('19; F '20), *Psychology*, 11 Church St., Wethersfield, Conn.
- '22. WEMBRIDGE, HARRY, *Psychology*.....1681 Fulton Road, Cleveland
- '91. WERNER, WILLIAM C. ('22), *Botany*.....422 N. St. Clair St., Painesville
- '96. WERTHNER, WILLIAM B. (F '20), *Botany*.....1525 Riverside Drive, Dayton
- '01. WESTGATE, LEWIS G. (F '20), *Geology*.....Delaware
- '22. WHIPPLE, RALPH W., *Geology, Mineralogy, Paleontology, Anthropology*...
Marietta College, Marietta
- '18. WICKLIFF, E. L. (F '23), *Zoology, Ornithology*.....
Dept. of Zoology and Entomology, O. S. U., Columbus
- '22. WILLARD, C. J., *Agronomy, Botany*.....O. S. U., Columbus
- '21. WILLIAMS, R. D., *Philosophy, Psychology*.....
Dept. of Philosophy, O. S. U., Columbus
- '13. WILLIAMS, SAMUEL R. (F '20), *Physics*.....154 Forest St., Oberlin
- '03. WILLIAMS, STEPHEN R. (F '20), *Biology*...300 E. Church St., Oxford
- '97. WILLIAMSON, E. B., *Entomology*.....Bluffton, Ind.
- '23. WILSON, HERRICK E., *Geology, Zoology, Medicine*, 224 W. College St., Oberlin
- '15. WITHROW, JAMES R. (F '20) *Chemistry, Mineralogy*..O. S. U., Columbus
- '20. WURDACK, MARY E., *Botany*.....29 Twelfth Ave., Columbus
- '03. YORK, HARLAN H., *Botany*...West Virginia Univ., Morgantown, W. Va.
- '21. YOUNG, HERMAN H., *Psychology, Educational Research*.....
Indiana University, Bloomington, Ind.
- '06. YOUNG, R. A., *Botany*.....120 Chestnut Ave., Takoma Park, D. C.
- '23. YOUNG, W. J., *Botany*..Ohio Agricultural Experiment Station, Wooster

Total Membership—324

REPORT
OF THE
THIRTY-THIRD ANNUAL MEETING
OF
The Ohio Academy of Science

The Thirty-third Annual Meeting of the Ohio Academy of Science was held at Oberlin College, Oberlin, March 30 and 31, 1923, under the Presidency of Professor Albert P. Weiss. Fifty-five members were registered as in attendance; twenty-five new members were elected.

The annual excursion of the Section for Geology was held on May 25, 26 and 27, under the general management of Professor J. Ernest Carman, Vice-President for 1923-24. The party gathered fifty strong at Newark, Ohio. The first day was devoted largely to archeology, in the study, under the guidance of Dr. W. C. Mills, of the earthworks near Newark and the flint quarries of Flint Ridge. Mr. Wilber Stout directed the remainder of the trip, which was planned for the observation of the Pennsylvanian and Permian rocks, the Quaternary molding sand deposits, and the topography of Muskingum County.

GENERAL PROGRAM.

FRIDAY, MARCH 30.

- 9:30 A. M.—Business Meeting.
11:00 A. M.—Reading of Papers in General Session.
12:30 P. M.—Luncheon.
2:00 P. M.—Illustrated Lecture by Professor Henry C. Cowles, of the University of Chicago, on "Trees as Witnesses in Boundary Disputes; an Instance of Applied Ecology."
3:00 P. M.—Reading of Papers in Sectional Meetings.
6:30 P. M.—Dinner.
8:00 P. M.—Address by the President of the Academy, Professor Albert P. Weiss, of Ohio State University, on "The Aims of Social Evolution."

SATURDAY, MARCH 31.

- 9:00 A. M.—Adjourned Business Meeting.
10:30 A. M.—Reading of Papers in General Session.
12:30 P. M.—Luncheon.
2:00 P. M.—Demonstrations.
2:30 P. M.—Reading of Papers in Sectional Meetings.

FRIDAY, MAY 25, TO SUNDAY, MAY 27.

Excursion of Section for Geology, Muskingum County.

MINUTES OF BUSINESS MEETINGS.

The first business session was called to order by President Weiss at 9:30 A. M., on Friday, March 30; an adjourned session was held at 9:00 A. M. on the following day.

The appointment of the following committees for the meeting was announced by the chair:

Committee on Membership—W. M. Barrows, Lynds Jones, E. L. Fullmer.

Committee on Resolutions—C. H. Kennedy, R. C. Osburn, G. D. Hubbard.

Committee on Necrology—T. C. Mendenhall.

The following *Auditing Committee* was elected by the Academy: Stephen R. Williams, M. M. Metcalf.

The following *Nominating Committee* was elected by the ballot of the Academy: R. C. Osburn, E. Lucy Braun, G. D. Hubbard, T. C. Mendenhall, C. G. Rogers, A. P. Weiss.

Report of the Secretary.

The following report by the Secretary was received and ordered filed.

March 30, 1923.

To the Ohio Academy of Science:

The work of the Secretary for the last year has been almost entirely routine. The following items may be reported for the sake of record.

A brief report of the Thirty-second Annual Meeting was sent to *Science*, and appeared in the number for September 8.

The Secretary was present to represent the Academy in the Council of the American Association for the Advancement of Science at the Boston Meeting.

The certificate of election to fellowship has been mailed, as directed by the Academy, to the fellows elected in 1920 and 1921, as well as to those elected in 1922.

Respectfully submitted,

EDWARD L. RICE, *Secretary.*

Report of the Treasurer for the Year 1922-1923.

The report of the Treasurer was received as follows and referred to the Auditing Committee, whose report is appended.

RECEIPTS.

Balance April 12, 1922, as previously reported.....	\$ 617.52
Librarian's sales of publications, 1921-1922.....	37.00
Librarian's sales of publications, 1922-1923.....	23.45
Membership dues, A. A. A. S. and the Ohio Academy.....	1,311.00
Total receipts.....	\$1,988.97

DISBURSEMENTS.

American Association for the Advancement of Science.....	\$693.00
The Ohio Journal of Science.....	370.60
Spahr and Glenn, printing.....	75.00
E. L. Rice, Secretarial expenses.....	33.10
Independent Print Shop.....	15.70
Lynds Jones, for expenses, executive committee.....	12.32
B. V. Bevin.....	2.00
Eunice Evans, stenographic work.....	10.00
Returned check.....	2.00
Total disbursements.....	\$1,222.92
Balance on hand, 1922-1923.....	\$ 766.05

A. E. WALLER, *Treasurer.*

The accounts herewith and vouchers checked over and found to be correct.

STEPHEN R. WILLIAMS,
MAYNARD M. METCALF,
Auditing Committee.

The following financial statement of Mr. L. H. Tiffany, manager of the Ohio Journal of Science, while not strictly a part of the Treasurer's Report, is appended for the information of the Academy.

FINANCIAL STATEMENT OF THE OHIO JOURNAL OF SCIENCE.
(Volume XXII, 1921-22. The Ohio Journal of Science).

RECEIPTS.

Ohio State University Allowance.....	\$500.00
A. E. Waller, Treasurer, Ohio Academy of Science.....	250.00
Reprints, extra copies of Journal.....	218.40
Total receipts.....	\$968.40

EXPENDITURES.

Bucher Engraving Company.....	\$ 58.18
Stenographic Work.....	3.50
Postoffice Deposit.....	3.89
Stamps, mailing and stationery.....	64.47
Total expenditures.....	<u>\$130.04</u>
Balance on hand 1921-22.....	<u>\$838.36</u>
Estimated cost of the Journal, 1921-22.....	\$1,000.00
Cash on hand, 1921-22.....	<u>838.36</u>
Deficit for 1921-22.....	161.64
Deficit for 1920-21.....	<u>447.31</u>
Total deficit.....	<u>\$ 508.95</u>

Report of the Executive Committee.

The report of the Executive Committee was received as follows and ordered filed.

March 30, 1923.

To the Ohio Academy of Science:

A meeting of the Executive Committee was held in Columbus, October 21, 1922. All members were present.

At this meeting the invitation to hold the Thirty-third Annual Meeting at Oberlin College was accepted, and the meeting was set for March 30 and 31.

The Secretary was instructed to arrange, if practicable, for the publication in the Ohio Journal of Science of a brief obituary notice of Mr. Emerson McMillin, in anticipation of a more adequate memorial to be presented at this meeting. The late appearance of this notice (in the January-February number) was unavoidable, because of the readjustment of the dates of publication of the Journal.

The Secretary presented a letter of June 10 from President Charles D. Walcott, of the Spencer Fullerton Baird Memorial, announcing plans for the celebration of the one-hundredth anniversary of the birth of Spencer Fullerton Baird, February 3, 1923, and inviting the Academy to designate a representative on the national committee. The letter closes with these paragraphs:

"Among the suggestions that have been made for a permanent national memorial are (1) a bust, statue, mural or open-air fountain, or bronze mural tablet to be provided by voluntary subscriptions and erected in the grounds of the Smithsonian Institution or the National Zoological Park, and (2) a fishery museum or exhibit, with public aquarium, embracing both the scientific and applied features of fishery problems, to be established by Congress under the auspices of the Smithsonian Institution.

"It has been suggested also that there be established a Baird Memorial Medal to be awarded periodically to persons performing noteworthy original or meritorious work in science, and that there be published during 1923, preferably under the auspices of the National Museum or the Smithsonian Institution, a memorial volume to be made up of original papers on scientific subjects contributed by Baird's associates, colleagues, and immediate followers.

"In advising me that your organization will be represented on the national Baird memorial committee, will you kindly communicate your views on the general subject of the memorial?"

The action of the Executive Committee is shown in the following quotation from the reply to Dr. Walcott's letter:

"Our committee was enthusiastically in favor of such a memorial and appointed Dr. Raymond C. Osburn, of Ohio State University, as our representative. As to the particular form of memorial, the consensus of opinion was in favor of the fountain or aquarium, rather than the other alternatives suggested in your letter. Dr. Osburn was, however, left without formal instructions."

On the suggestion of the Treasurer, it was voted to allow to each new member the option of receiving the back numbers of the *Ohio Journal of Science* from January to the time of election or of commencing the *Journal* with the following January, as he may prefer.

A second meeting of the Committee was held in Oberlin on March 29, 1923. All members present.

In accordance with the instructions of the last Annual Meeting, the Committee has prepared a series of amendments to the Constitution, establishing the Committee on State Parks and Conservation as a standing committee of nine members, and providing for the election of three members each year for a term of three years. These amendments will be presented for adoption later in the session. The expiration of the term of office of the committee membership was determined by lot, as follows: Herbert Osburn, Chairman, 1925; E. Lucy Braun, 1924; J. E. Carman, 1924; Bruce Fink, 1926; E. L. Fullmer, 1925; E. R. Hayhurst, 1926; F. H. Herrick, 1925; C. G. Shatzer, 1924; E. N. Transeau, 1926.

The Committee voted to recommend that the Academy heartily endorse the efforts of the Ohio College Association toward the securing of uniformity in date of the spring vacation of the colleges of Ohio, as facilitating attendance at meetings of the Ohio College Association, Ohio Academy of Science, and other societies consisting largely of college men.

The Committee also voted to recommend to the Academy an amendment of the By-Laws providing an annual honorarium of one hundred dollars for the Secretary, this honorarium to include expenses for clerical assistance.

Sixteen applications for membership have been approved, subject to final ratification by the present meeting.

Respectfully submitted,

EDWARD L. RICE, *Secretary.*
For the Committee.

Report of the Publication Committee.

The following report of the Publication Committee was received and ordered filed.

The Annual Report of the Thirty-second Meeting, Proceedings, Vol. VII, Part 7, contained 36 pages and was published March 1, 1923.

The report minus the membership list was also published in the Ohio Journal of Science 23 : 1-24, 1923.

Respectfully submitted,

H. C. SAMPSON, *Chairman.*

Report of the Library Committee.

The following report of the Library Committee was received and ordered filed.

March 29, 1923.

To the Ohio Academy of Science:

The Library Committee begs to report that all the duties devolving upon it have been discharged as promptly as possible.

The sale of publications during the year amounted to \$23.45. This amount has been turned over to the Treasurer of the Academy.

The Proceedings of the Thirty-second Annual Meeting, 1922, were received from the printer on March 12, 1923. Copies were mailed immediately to all persons on the membership roll, and to all institutions on the exchange list.

The publications which have been received on exchange have been added to the others previously filed in the University Library. The University Library would like to see more use made of these exchanges and other scientific sets by the members of the Academy who are non-resident in Columbus. The University Library annually renews its offer to lend to the members of the Academy, through their home libraries, the scientific publications needed in their research work.

The writer of this report desires to call the attention of the Academy to Section 3 in House Bill No. 400, "A bill relative to state recognition of the Ohio Academy of Science" now before the 85th General Assembly. On page 2, lines 28, 29 and 30, read as follows: "All exchanges received shall be kept available to the citizens of the state through the Ohio State Library, or such other channel as may be determined." . . . While not wanting to say anything to affect the cordial relations existing between the Ohio State Library and the Ohio State University Library, yet be it said that if an individual library is to be specified in the bill, it ought to be the library which is at present, and has been for eight years handling the exchanges of the Academy, namely, the Ohio State University Library. If the bill should be made to read that exchanges were to be kept at such a place as may be determined by the Academy, no objection could be made, because the question of the disposition of its property is a right inherent in the organization.

Furthermore, it may not be known to the members of the Academy, but the facts are that the State Library and the University Library are dividing the field between the two institutions, whereby the technical and scientific literature is to be developed by the University Library. In accordance with this plan, it would naturally fall to the University Library to handle and make available any scientific literature received by the Academy.

Section 3 of this bill also needs redrafting, especially as it relates to the distribution of the publications of the Academy. As drafted, it provides that one copy of the Proceedings shall be sent to each public library and museum, university, college, normal school and first grade high school. It also provides that one copy of the Ohio Journal of Science shall be sent to each university and college. Then, it provides that "not less than one hundred copies of each publication shall be distributed through the Ohio State Library." Since the provision is made specifically for the distribution of the publications, to whom is the State Library to send its one hundred copies?

Furthermore, the Academy does not control the Ohio Journal of Science. If such is the case, can this bill, which relates to the Academy, provide for the distribution of the Journal, for the handling of its exchanges, and for grant of one hundred copies to the Ohio State Library?

The Ohio State University has been paying to the Ohio Journal of Science \$500.00 a year, for which sum 250 copies of each issue have been allotted the University Library for exchanges. Under the proposed legislation, some complications are likely to occur if such exchanges are to be deposited in the Ohio State Library.

These statements are made with the friendliest of feelings, but with the purpose of pointing out some features in Section 3 which need more study, in order to keep the Academy from difficulties into which it may unknowingly place itself.

This bill was introduced into the House by Mr. Riggs on February 21st; was read the second time on February 28th, and then referred to the Committee on State and Economic Betterment. It was reported out on March 23d.

If the Academy feels that these points are of importance, it may be proper to instruct its Legislature Committee to seek the desired changes in the bill, either as amendments on the floor, or in the Senate committee, should the bill pass the House.

Respectfully submitted,

By C. W. REEDER,

For the Library Committee.

Report of the Trustees of the Research Fund.

The following report of the Trustees of the Research Fund was received and referred to the Auditing Committee, whose report is appended.

To the Ohio Academy of Science:

The Trustees of the Research Fund submit the following Report for the period from March 29th, 1922, to March 30th, 1923.

RECEIPTS.

Cash on hand March 28th, 1922.....	\$1.090 20
Interest on bonds.....	36.12
	\$1,126.32

EXPENDITURES.

May 8th, 1922, Postage.....	\$ 2.00
June 12th, L. B. Walton.....	35.80
July 24th, Francis H. Herrick.....	99.75
August 19th, L. H. Tiffany.....	47.71
September 16th, James E. Kindred.....	75.00
December 8th, E. L. Stover.....	16.20
March 13th, 1923, Raymond A. Dobbins.....	26.30
	\$ 302.76

ASSETS.

Cash on hand March 29th, 1923.....	\$823.56
Liberty Bonds at par.....	600.00
	\$1,423.56

LIABILITIES.

Balance on grants to:	
L. H. Tiffany.....	\$ 2.29
R. A. Dobbins.....	73.70
E. L. Stover.....	33.80
Francis H. Herrick.....	25
	\$ 110.04
Excess of cash assets above liabilities.....	\$ 713.52

Vouchers are submitted herewith.

T. C. MENDENHALL, *Chairman*,
GEO. D. HUBBARD,
HERBERT OSBORN,

Trustees.

Books audited and found correct.

STEPHEN R. WILLIAMS,
MAYNARD M. METCALF,
Auditing Committee.

Report of the Committee on State Parks and Conservation.

The following report of the Committee on State Parks and Conservation was received and ordered filed.

To the Ohio Academy of Science:

Your Committee can not report any very extensive activity during the past year, but there are several matters of interest which it will be proper to mention.

The final acquisition and dedication of the Roosevelt Park in southern Ohio establishes an extensive and very desirable tract as a permanent game refuge in which we can be assured of the preservation of the natural conditions; and it would appear a very satisfactory arrangement for control between the Fish and Game Commission and State Forester, both of whom, no doubt, will accept suggestions concerning biological features that may be of service.

Under the Silver Bill the State Forester has secured additional tracts for State Forestry purposes, and these, of course, are distinct advances in the matter of preservation of the native flora and fauna.

The present Legislature has enacted or will probably enact a Bill accepting the Bryan farm near Yellow Springs, a tract of something over 500 acres, which was given to the State for preservation as a game refuge, and experiment farm, and under the conditions provided in the present act, will doubtless furnish an additional valuable tract for the preservation of natural conditions.

The transfer of a tract of fifty-seven acres, including the Harness Mounds from the United States Government to the State, under the control of the State Archeological Society, gives us another interesting tract as a public park.

Failure of the National Congress to pass the bill to provide for national game reserves, which would have made possible the preservation of swamp areas and other suitable breeding grounds for migratory fowl, makes it, of course, more desirable that the State should set aside a number of such tracts within our borders for the purpose of conserving wild life dependent upon such conditions. It seems therefore that one of the early movements of the Academy should be to secure, through the Fish and Game Commission or such other channel as may be available, certain reservations of this character.

The waterways project now being considered by the National Government, which would provide a waterway from the Lake to the Ohio River, is a matter of very distinct interest to the members of the Academy, especially in reference to its features of conservation and utilization of water resources in the State. Such a waterway with its reservoir system would make some very important additions to the water areas and utilization, and your Committee will endeavor to keep in close touch with progress in this line.

Respectfully submitted,

HERBERT OSBORN, *Chairman*,
FRANCIS H. HERRICK,
E. N. TRANSEAU,
J. ERNEST CARMAN,
C. G. SHATZER.

Report of the Committee on Legislation.

The following report, presented by the Committee on Legislation, was received as a report of progress, and the Committee was continued. In view of the questions raised in the Report of the Library Committee with reference to the bill for State recognition of the Academy, Mr. Reeder was added to the Committee on Legislation.

The Committee is able to report that a bill for the recognition of the Ohio Academy has been introduced in the Legislature, and two members of the Committee had a conference with the Committee to which the bill was referred. It received a very cordial consideration, and so far as this Committee is concerned, it appears that the bill will

have cordial support. Just what fate it may have in the House we cannot say. Furthermore, the bill will have to be acted upon by the Senate, and considering the lateness of the session, we are somewhat in doubt as to the outcome.

The bill as drafted was changed in two particulars from the bill as agreed upon in the Academy, but the changes made, we believe, will not defeat the objects of the proposed relation to the State. If passed, it should enable the Academy to extend its usefulness and to secure modifications if necessary in the future.

We recommend that the Committee be continued or a new Committee appointed with authority to adjust the constitution and make any arrangement of details necessary in the carrying out of the provisions of the bill.

Respectfully submitted,

HERBERT OSBORN, *Chairman*,
T. C. MENDENHALL,
W. H. ALEXANDER,
EDWARD L. RICE,
MAYNARD M. METCALF.

Election of Officers.

The following officers and committee members for 1923-24 were elected by the ballot of the Academy.

President—Professor K. F. Mather, Denison University, Granville.

Vice-Presidents:

Zoology—Professor W. M. Barrows, Ohio State University, Columbus.

Botany—Professor H. H. M. Bowman, Toledo University, Toledo.

Geology—Professor J. E. Carman, Ohio State University, Columbus.

Physics—Mr. W. C. Devereaux, U. S. Weather Bureau, Cincinnati.

Medical Sciences—Professor B. M. Patten, Western Reserve University, Cleveland.

Psychology—Professor H. A. Aikins, Western Reserve University, Cleveland.

Secretary—Mr. W. H. Alexander, U. S. Weather Bureau, Columbus.

Treasurer—Dr. A. E. Waller, Ohio State University, Columbus.

Elective Members of Executive Committee—Professor A. P. Weiss, Ohio State University, Columbus; Professor E. L. Rice, Ohio Wesleyan University, Delaware.

Member of Publication Committee—Professor L. B. Walton, Kenyon College, Gambier.

Trustee of Research Fund—Professor Herbert Osborn, Ohio State University, Columbus.

Member of Library Committee—Professor F. O. Grover, Oberlin College, Oberlin.

Representatives on Editorial Board of Ohio Journal of Science:

Zoology—Professor R. A. Budington, Oberlin College, Oberlin.

Botany—Professor Bruce Fink, Miami University, Oxford.

Geology—Professor G. D. Hubbard, Oberlin College, Oberlin.

Physics—Professor S. J. M. Allen, University of Cincinnati, Cincinnati.

Medical Sciences—Professor F. C. Waite, Western Reserve University, Cleveland.

Psychology—Professor H. A. Aikins, Western Reserve University, Cleveland.

Election of Members.

The Membership Committee reported nine names for election to membership; sixteen additional names, previously approved by the Executive Committee and marked with (*) in the following list, were presented for ratification. All were elected, as follows:

*BANGHAM, RALPH V.; Zoology, Anatomy; Dept. of Zoology and Entomology, Ohio State University, Columbus.

BEAM, J. ALBERT; Zoology; 174 Greenfield St., Tiffin.

*BOHSTEDT, G.; Animal Nutrition and Genetics; Ohio Agricultural Experiment Station, Wooster.

*BRYANT, WILLIAM L.; Vertebrate Paleontology, American Anthropology; 1231 Elmwood Ave., Buffalo, N. Y.

CULP, VERNON L.; Chemistry, Biology, Physiography; 837 Berwyn St., Akron.

*DEAM, CHARLES C.; Botany, Forestry; Bluffton, Ind.

*DEAN, FOREST W.; Forestry, Botany, Entomology; Ohio Agricultural Experiment Station, Wooster.

*FREER, RUSKIN S.; Botany; East Liberty.

*GILMOR, GRACE; Plant Physiology, Botany; R. D. No. 1, Wooster.

HARTZELL, ALBERT; Entomology, Zoology; Dept. of Zoology and Entomology, Ohio State University, Columbus.

*HITCHCOCK, FRED A.; Zoology, Physiology; 1524 Wesley Ave., Columbus.

*INMAN, ONDESS L.; General Physiology; Antioch College, Yellow Springs.

IRWIN, N. MILDRED; Botany; 6405 Roe St., Cincinnati.

*JOHNSON, HOWARD W.; Botany; Dept. of Botany, Ohio State University, Columbus.

JONES, EDWARD S.; Psychology; 79 S. Cedar St., Oberlin.

McEWEN, ROBERT STANLEY; Zoology; 208 Forest St., Oberlin.

PAINTER, DONALD H.; Geology; 318 Grand Ave., Dayton.

*PHILLIPS, T. G.; Chemistry, Botany; Dept. of Agricultural Chemistry, Ohio State University, Columbus.

*SWINNERTON, ALLYN C.; Geology; Antioch College, Yellow Springs.

- VANHORN, JESSE LOWER; Chemistry and Physics; 1490 Roycraft Ave., Lakewood.
- *WERNER, WILLIAM C.; Botany; 422 N. St. Clair St., Painesville.
- *WHIPPLE, RALPH W.; Geology, Mineralogy, Paleontology, Anthropology; Marietta College, Marietta.
- *WILLARD, C. J.; Agronomy, Botany; Ohio State University, Columbus.
- WILSON, HERRICK E.; Geology, Zoology, Medicine; 224 W. College St., Oberlin.
- *YOUNG, W. J.; Botany; Ohio Agricultural Experiment Station, Wooster.

Report of the Committee on Election of Fellows.

The following report of the Committee on Election of Fellows was accepted and ordered filed.

March 30, 1923.

To the Ohio Academy of Science:

A meeting of the Committee on Election of Fellows was held last evening in Oberlin. Six members of the committee were present; three were represented by duly authorized proxies; two were absent without representation.

Of the candidates considered eight received the necessary nine favorable votes and were declared elected. The fellows elected will be personally notified, and the list will be published in the Proceedings.

Respectfully submitted,

EDWARD L. RICE, *Secretary,*
For the Committee.

The list of members elected to fellowship is as follows:

WILLIAM LETCHWORTH BRYANT	WARREN N. THAYER
WALTER C. KRAATZ	ROY CURTIS THOMAS
PAUL MARSHALL REA	LEWIS HANFORD TIFFANY
SEPTIMUS SISSON	EDWARD L. WICKLIFF

Resolutions.

The following resolutions were adopted by the Academy:

1. The Ohio Academy of Science hereby extends its cordial thanks to the Local Committee and the authorities of Oberlin College for the careful arrangements and many courtesies which have made possible this most successful meeting.
2. The Academy desires also to thank Professor Henry C. Cowles, of the University of Chicago, for the fascinating address on "Trees as Witnesses in Boundary Disputes: an Instance of Applied Ecology," and for his participation in the symposium on "Geographical Distribution of Plants and Animals."

3. The Academy further expresses to Professor Rice its gratitude for his years of service as secretary, a service involving much sacrifice on his part; and we record our appreciation of the fact that the increasing strength of the Academy during the last decade has been due in considerable measure to his influence.

Report of the Committee on Necrology.

The report of the Committee on Necrology consisted of a memoir of Emerson McMillin, 1844-1922, prepared and read by Dr. T. C. Mendenhall. The report was adopted by the Academy. By action of the Executive Committee and Trustees of the Research Fund for 1923-24, to whom, as a joint committee, the matter was referred with power, this memoir has already appeared in the Ohio Journal of Science for May-June, 1923, and is omitted from the Annual Report.

Amendments of Constitution.

ART. IV, SECTION 6a. *Committee on State Parks and Conservation.* New section, to be renumbered on reprinting of Constitution. The Committee on State Parks and Conservation shall consist of nine members elected in accordance with the provisions of Section 16.

ART. IV, SECTION 15a. *Duties of Committee on State Parks and Conservation.* New section, to be renumbered on reprinting of Constitution. The Committee on State Parks and Conservation shall consider the various possibilities in the formation of State Parks in areas of scenic, geologic, or biologic interest, and other effective methods for the preservation of the native fauna and flora and for the conservation of the natural resources of the State; it shall co-operate in all possible ways with other societies, institutions, and State officers in the promotion of these objects.

ART. IV, SECTION 16. *Terms of Office.* Amended to read: The President, Vice-Presidents, Secretary, Treasurer, and elective members of the Executive Committee and Publication Committee shall be elected annually at the annual meeting, and shall be eligible to re-election without limitation, with the exception of the President, who shall not be elected for successive terms. The Trustees of the Research Fund, the members of the Library Committee, and the members of the Com-

mittee on State Parks and Conservation shall be elected for a term of three years, one Trustee, one member of the Library Committee, and three members of the Committee on State Parks and Conservation being elected each year.

Amendment of By-Laws.

CHAPTER II, SECTION 3. *Honorarium of Secretary.* New section. The Secretary shall receive an annual honorarium of one hundred dollars, from which he shall pay for any clerical help employed.

McMillin Prize.

A recommendation was presented by Dr. T. C. Mendenhall, for the Trustees of the Research Fund, that the research fund of the Academy be invested as a permanent endowment, and that the interest derived from the same be devoted to a prize bearing the name of Mr. Emerson McMillin.

The general plan was endorsed by the Academy, and the working out of details was referred to the Executive Committee and the Trustees of the Research Fund for report at the next annual meeting. For the year 1923-24 the use of the income of the research fund was referred to the Trustees with power.

Uniform Spring Vacation.

On the recommendation of the Executive Committee, it was voted that the Ohio Academy of Science heartily endorse the efforts of the Ohio College Association toward the securing of uniformity in the date of the spring vacation of the colleges of Ohio, as facilitating attendance at meetings of the Ohio College Association, Ohio Academy of Science, and other societies consisting largely of college men.

Scientific Sessions.

The complete scientific program of the meeting follows:

PRESIDENTIAL ADDRESS.

The aims of social evolution.....A. P. WEISS

PUBLIC LECTURE.

Trees as witnesses in boundary disputes: an instance of applied ecology.
HENRY C. COWLES

SYMPOSIUM ON GEOGRAPHICAL DISTRIBUTION OF PLANTS AND ANIMALS.

Geological factors in animal and plant distribution.....G. D. HUBBARD
Some factors in plant distribution.....H. C. COWLES
The distribution of vegetation in relation to physiographic provinces,
E. LUCY BRAUN
The places of origin of the several families of Anura.....M. M. METCALF
Factors which determine local distribution of spiders.....W. M. BARROWS
Some problems in the distribution of dragonflies. (Lantern),
CLARENCE H. KENNEDY

SYMPOSIUM ON CURRENT PROBLEMS OF OHIO GEOLOGY.

Early Paleozoic stratigraphy.....W. H. SHIDELER
Middle Paleozoic stratigraphy.....J. ERNEST CARMAN
Stratigraphy of the Carboniferous formations.....J. E. HYDE
Paleozoic faunas and their correlation.....A. F. FOERSTE
Some work yet to be done in Ohio physiography.....GEO. D. HUBBARD
Economic geology.....J. A. BOWNOCKER
Structural geology.....W. H. BUCHER

PAPERS.

1. Weather and human conduct. (30 min., lantern)..WILLIAM H. ALEXANDER
2. Some Old World botanic gardens. (25 min., lantern).....A. E. WALLER
3. Some features of the Park Area of the Cleveland Metropolitan Park District. (20 min., lantern).....E. L. FULLMER
4. The Cleveland Museum of Natural History. (25 min.).....P. M. REA
5. An "eagle" observatory at Vermilion; results obtained in 1922. (40 min., lantern).....FRANCIS H. HERRICK
6. A contribution to our knowledge of the life history and physiology of *Euglena*. (15 min.).....W. J. KOSTIR
7. The so-called allelocatalytic effect in the reproduction of Protozoa. (5 min.).....W. J. KOSTIR
8. The persistence of archaic parasites through many geologic periods. (10 min., opaque projection).....MAYNARD M. METCALF
9. The origin of American opalinids. (15 min., opaque projection),
MAYNARD M. METCALF
10. Two new cestode parasites in black bass of Ohio; life history, distribution, etc. (10 min.).....RALPH V. BANGHAM
11. Life history studies of Homoptera. (10 min., lantern)...HERBERT OSBORN
12. Jumping mouse, *Zapus hudsonius*, in Ohio. (10 min.).....H. A. GOSSARD
13. The geographic distribution of Arctic Bryozoa. (10 min., lantern),
RAYMOND C. OSBURN
14. The inheritance of the nail-biting habit. (10 min., lantern), W. M. BARROWS
15. A case of extra digits in the manus of the pig. (10 min., lantern),
STEPHEN R. WILLIAMS
16. On the origin of some embryonic abnormalities. (10 min.) R. A. BUDINGTON

17. Comparative physiology as an undergraduate study. (15 min.),
CHAS. G. ROGERS
18. Physiological evidences of animal relationship. (15 min.)...CHAS. G. ROGERS
19. Lorain County Polyporaceae. (5 min.).....F. O. GROVER
20. The vegetation of Ohio. (Lantern).....E. N. TRANSEAU
21. Studies on the genus *Ampelopsis*. (15 min., lantern).....GRACE GILMOR
22. Variations in the root system of the common everlasting *Gnaphalium*
polycephalum. (10 min.).....HELEN GUHMAN
23. Soil reactions and plant succession. (15 min.),
E. LUCY BRAUN AND SYLVIA GEISLER
24. Importance of resistance of the host in the control of plant diseases.
(20 min.).....W. J. YOUNG
25. Observations on the sexual state of various plants. (15 min.),
J. H. SCHAFFNER
26. The time of sex determination in plants. (12 min.).....J. H. SCHAFFNER
27. Some chemical changes accompanying growth and reproduction in
Spirogyra. (15 min.).....L. H. TIFFANY
28. Flora of the muck land of Delaware County, Indiana. (10 min.),
BLANCHE MCAVOY
29. Notes on the distribution of sea grasses. (10 min., lantern),
H. H. M. BOWMAN
30. Prairie openings on the Little Miami River. (20 min., lantern),
M. MILDRED IRWIN
31. Concerning some ostracoderms from Ohio. (15 min., lantern),
J. ERNEST CARMAN
32. The temperature and brightness of tungsten lamps. (20 min), W. E. FORSYTHE
33. Effect of tension on change of resistance and thermoelectromotive force
by transverse magnetization.....ALPHEUS W. SMITH

DEMONSTRATIONS.

1. Methods of recording bird migration.....LYNDS JONES
2. Drawings of penes of dragonflies.....CLARENCE H. KENNEDY
3. Preserved skin specimen of jumping mouse, *Zapus hudsonius*. H. A. GOSSARD
4. A cent found in the pharynx of a cat from the comparative anatomy
laboratory.....STEPHEN R. WILLIAMS
5. Microscopic slides illustrating paper 13, on cestode parasites of black bass,
RALPH V. BANGHAM
6. Roots of the common everlasting *Gnaphalium polycephalum*; variations
described in paper 25.....HELEN GUHMAN
7. Thorns of honey locust, *Gleditsia triacanthos*.....F. E. BEGHTEL
8. Twigs as a basis for winter tree study; a method of mounting,
E. LUCY BRAUN
9. Rainfall and vegetation map of Asia.....GEO. D. HUBBARD
10. Drawings of opalinids.....MAYNARD M. METCALF
11. Distribution maps of opalinids and their hosts, illustrating papers 8 and 9
and contribution to symposium on geographical distribution,
MAYNARD M. METCALF

PROCEEDINGS
OF THE
OHIO
ACADEMY OF SCIENCE

AFFILIATED WITH THE
AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE

VOLUME VII, PART NINE

Annual Report
Thirty-Fourth Meeting

ANNUAL REPORT

OF THE

OHIO ACADEMY OF SCIENCE

Thirty-Fourth Meeting

1924

Organized 1891

Incorporated 1892

Affiliated with the American Association for the Advancement of Science

PUBLICATION COMMITTEE

H. C. SAMPSON

L. B. WALTON

L. G. WESTGATE

Date of Publication, September, 1924

Published by the Academy
Columbus, Ohio

OFFICERS, 1924-1925

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E. N. TRANSEAU

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EDMUND SECREST
G. W. CONREY

C. D. COONS
R. G. HOSKINS
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WM. H. ALEXANDER

Treasurer

A. E. WALLER

Executive Committee

Ex-Officio: E. N. TRANSEAU, WM. H. ALEXANDER, A. E. WALLER

Elective: C. G. SHATZER, B. M. PATTEN

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HERBERT OSBORN, <i>Chairman</i> , term expires.....	1926
G. D. HUBBARD, term expires.....	1925
E. L. RICE, term expires.....	1927

Publication Committee

H. C. SAMPSON, <i>Chairman</i> , term expires.....	1925
L. B. WALTON, term expires.....	1926
L. G. WESTGATE, term expires.....	1927

Library Committee

C. W. REEDER, <i>Chairman</i> , term expires.....	1925
F. O. GROVER, term expires.....	1926
F. C. BLAKE, term expires.....	1927

Committee on State Parks and Conservation

HERBERT OSBORN, <i>Chairman</i> , term expires.....	1925
E. L. FULLMER, term expires.....	1925
F. H. HERRICK, term expires.....	1925
BRUCE FINK, term expires.....	1926
E. R. HAYHURST, term expires.....	1926
E. N. TRANSEAU, term expires.....	1926
E. LUCY BRAUN, term expires.....	1927
EDMUND SECREST, term expires.....	1927
C. G. SHATZER, term expires.....	1927

PAST OFFICERS

Presidents

1892.	E. W. CLAYPOLE	1909.	J. H. SCHAFFNER
1893.	EDWARD ORTON	1910.	W. F. MERCER
1894.	F. M. WEBSTER	1911.	L. G. WESTGATE
1895.	D. S. KELLCOTT	1912.	BRUCE FINK
1896.	A. A. WRIGHT	1913.	L. B. WALTON
1897.	W. A. KELLERMAN	1914.	T. C. MENDENHALL
1898.	W. G. TIGHT	1915.	J. WARREN SMITH
1899.	G. F. WRIGHT	1916.	G. D. HUBBARD
1900.	JOSUA LINDAHL	1917.	F. O. GROVER
1901.	A. D. SELBY	1918.	F. L. LANDACRE
1902.	W. R. LAZENBY	1919.	M. M. METCALF
1903.	C. J. HERRICK	1920.	F. C. BLAKE
1904.	E. L. MOSELEY	1921.	W. H. ALEXANDER
1905.	HERBERT OSBORN	1922.	R. C. OSBURN
1906.	E. L. RICE	1923.	A. P. WEISS
1907.	CHARLES DURY	1924.	KIRTLEY F. MATHER
1908.	FRANK CARNEY		

Vice-Presidents

1892.	A. A. WRIGHT, ELLEN E. SMITH
1893.	D. S. KELLCOTT, D. L. JAMES
1894.	G. H. COLTON, MRS. W. A. KELLERMAN
1895.	H. E. CHAPIN, JANE F. WINN
1896.	A. L. TREADWELL, CHARLES DURY
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1898.	JOSUA LINDAHL, J. H. TODD
1899.	CHAS. E. ALBRIGHT, A. D. SELBY
1900.	J. A. BOWNOCKER, LYNDY JONES
1901.	H. HERZER, MRS. W. A. KELLERMAN
1902.	C. J. HERRICK, C. S. PROSSER
1903.	J. A. BOWNOCKER, MRS. L. C. RIDDLE
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1905.	C. W. DABNEY, F. M. COMSTOCK
1906.	CHARLES DURY, LYNDY JONES
1907.	W. F. MERCER, FRANK CARNEY
1908.	J. H. SCHAFFNER, F. C. WAITE
1909.	L. G. WESTGATE, S. R. WILLIAMS
1910.	M. M. METCALF, BRUCE FINK, G. D. HUBBARD
1911.	CHAS. BROOKOVER, M. E. STICKNEY, G. D. HUBBARD
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1893.	Columbus	1910.	Akron
1894.	Columbus	1911.	Columbus
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1897.	Columbus	1914.	Columbus
1898.	Columbus	1915.	Columbus
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- '22. MARQUART, J. ROGER, *Zoology, Botany*...900 N. Limestone St., Springfield
- '24. MARTIN, CLARE, *Chemistry, Physics*.....
State Norman College, Bowling Green
- '24. MASON, CAPT. PAUL, *Archeology, Meteorology, Public Health*.....
271 S. Champion Ave., Columbus
- '19. MATEER, FLORENCE (F '21), *Psychology*...156 S. 18th St., Columbus
- '07. MATHER, KIRTLEY F. ('21; F '22), *Geology*..Denison Univ., Granville
- '24. MATHEWS, ALBERT P., *Biochemistry, Physiology*.....
University of Cincinnati, 255 Loraine Ave., Cincinnati
- '23. MAY, CURTIS, *Botany*.....Dept. of Botany, O. S. U., Columbus
- '00. MERCER, W. F. (F '20), *Biology*.....Ohio University, Athens

- '09. METCALF, C. L. (F '20), *Entomology, Zoology*.....
Department of Entomology, Univ. of Illinois, Urbana, Ill.
- '08. METCALF, M. M. (F '20), *Zoology*..... Oberlin
- '03. METCALF, ZENO P., *Ornithology*.....State College Station, Raleigh, N. C.
- '14. METZGER, ALBERT C. D., *Chemistry, Ornithology, Geography*.....
380 Deshler Ave., Columbus
- '22. MEYER, BERNARD S., *Botany*...Dept. of Botany, O. S. U., Columbus
- '20. MILLER, DAYTON C. (F '20), *Physics*.....
Case School of Applied Science, Cleveland
- '24. MILLER, DAVID F., *Zoology*.....1466½ Pennsylvania Ave., Columbus
- '98. MILLS, W. C. (F '20), *Archeology, Biology*.....O. S. U., Columbus
- '20. MINCHIN, HOWARD D., *Physics*.....O. S. U., Columbus
- '18. MITCHELL, ROGER I., *Entomology*.....Sta. E, Route 6, Columbus
- '19. MITRA, SWARNA KUMER, *Botany*.....
Economic Botanist to Govt. of Assam, Sylhet, Assam, India
- '24. MOON, M. DELLA, *Botany, Zoology*.....Bluffton College, Bluffton
- '21. MOORE, DWIGHT M., *Botany*.....Granville
- '12. MORE, LOUIS T. (F '20), *Physics*.....Univ. of Cincinnati, Cincinnati
- '91. MORREY, C. B. ('19; F '20), *Bacteriology*.....O. S. U., Columbus
- '21. MORSE, PAUL FRANKLIN, *Geology*.....
Mississippi Geolog. Survey, Jackson, Miss.
- '06. MORSE, W. C. (F '20), *Geology, Dept. of Geology, Agricultural Coll.*, Miss.
- '91. MOSELEY, E. L. (F '20), *Zoology, Botany, Physiography*.....
State Normal College, Bowling Green
- '24. MOSES, C. F., *Geology*.....Muskingum College, New Concord
- '19. MOSHER, EDNA, *Entomology*, Univ. of New Mexico, Albuquerque, N. M.
- '13. MOTE, DON C. (F '20), *Zoology, Entomology*.....
Office of State Entomologist, Phoenix, Ariz.
- '21. MYERS, GARRY C., *Psychology*, Cleveland School of Education, Cleveland
- '15. NAPPER, CHARLES W., *Geology*.....Greenfield
- '22. NEISWANDER, CLAUDE R., *Zoology*.....Rawson
- '05. NELSON, JAMES A. (F '20), *Zoology, Embryology*.....Mt. Vernon
- '09. NICHOLS, SUSAN P. (F '22), *Botany*.....39 N. Cedar St., Oberlin
- '21. NIEHAUS, WM. E., *Botany, Geology*.....320 Beech St., Berea
- '93. OBERHOLSER, H. C. (F '21), 2805 Eighteenth St., N.W., Washington, D.C.
- '99. ODENBACH, F. L., *Meteorology*.....John Carrell University, Cleveland
- '16. OKEY, CATHARINE W., *Anatomy, Zoology*.....
Western College for Women, Oxford
- '24. OLSON, HENRY W., *Zoology*.....356 Centner Ave., Columbus
- '13. O'NEAL, CLAUDE E. (F '20), *Botany*.....95 Oak Hill Ave., Delaware
- '24. ORR, GROVER L., *Chemistry, Physics*.....767 College Ave., Columbus
- '98. OSBORN, HERBERT (F '20), *Entomology, Zoology*...O. S. U., Columbus
- '96. OSBURN, RAYMOND C. (F '20), *Zoology, Ichthyology*.....
Botany and Zoology Bldg., O. S. U., Columbus
- '19. OTIS, CHARLES H. (F '20), *Botany*.....
Biological Laboratory, Western Reserve Univ., Cleveland

- '23. PAINTER, DONALD H., *Geology*.....318 Grand Ave., Dayton
- '24. PALLISTER, JOHN C., *Entomology, Zoology*.....
Cleveland Museum of Natural History, 2717 Euclid Ave., Cleveland
- '18. PARKS, T. H. (F '20), *Entomology*.....
Botany and Zoology Bldg., O. S. U., Columbus
- '22. PARROT, G. H., *Biology, Geology, Physics*...41 E. Eighth Ave., Columbus
- '21. PATTEN, BRADLEY M. (F '22), *Zoology, especially Embryology*.....
1353 East Ninth St., Cleveland
- '24. PATTERSON, EDNA, *Zoology, Entomology, Botany, Astronomy*.....
130 W. Tenth Ave., Columbus
- '21. PATTON, LEROY, *Geology*.....Muskingum College, New Concord
- '21. PETERS, HAROLD S., *Ornithology and Botany*...363 W. Ninth Ave., Columbus
- '24. PETERSON, CHARLES J., *Horticulture*...Peterson Nurseries Co., Wilmington
- '14. PHILLIPS, RUTH L., *Biology and Allied Sciences*, Western College, Oxford
- '22. PHILLIPS, T. G., *Chemistry, Botany*.....
Dept. of Agricultural Chemistry, O. S. U., Columbus
- '15. PLOWMAN, AMON B. (F '20), *Botany, Physiology, Zoology*.....
346 Crown St., Akron
- '24. POLLITZ, LOUISE C., *Geology, Geography, Ecology*.....
Cleveland Museum of Natural History, Cleveland
- '22. PRESSEY, MRS. LUELLA W., *Psychology*.....
Apt. 18, Indianola Courts, 1778 N. High St., Columbus
- '22. PRESSEY, SIDNEY L., *Psychology*.....
Department of Psychology, O. S. U., Columbus
- '12. RANKIN, JOHN P., *Biology, Medicine*...St. Luke's Hospital, New York City
- '22. RAUP, HUGH M., *Zoology, Botany*...1845 N. Fountain Blvd., Springfield
- '21. REA, PAUL M. (F '23), *Natural History Sciences, especially Zoology*,
The Cleveland Museum of Natural History, 2717 Euclid Ave., Cleveland
- '16. REEDER, C. W.Library, O. S. U., Columbus
- '24. REEVES, PRENTICE, *Psychology, Medical Sciences*.....
208 N. Sandusky St., Delaware
- '01. RICE, EDWARD L. (F '20), *Zoology*.....Delaware
- '24. RICKEY, EDNA, *Psychology, Medical Sciences*.....53 Smith Place, Columbus
- '19. RIDENOUR, ALICE LOUISE, *General Science*.....London
- '21. RILEY, C. L., *Biology, Geology*.....1226 Fourteenth St., N. W., Canton
- '14. ROBINSON, J. M., *Entomology*.....Auburn, Ala.
- '24. ROFKAR, WILLIAM F., *Zoology, Botany, Geology*.....504 Beall Ave., Wooster
- '19. ROGERS, A. SOPHIE, *Psychology*...Dept. of Psychology, O. S. U., Columbus
- '13. ROGERS, CHARLES G. (F '20), *Physiology*.....378 Reamer Place, Oberlin
- '14. ROOD, ALMON N., *Botany*.....R. F. D. No. 2, Phalanx Station
- '21. ROOTS, YALE K., *Physics*.....553 N. Bever St., Wooster
- '21. ROSS, HERBERT W., *Chemistry, Geology*.....
West Technical High School, Cleveland
- '00. ROUDEBUSH, LOWELL.....R. F. D. No. 3, New Richmond
- '22. RUNNELLS, HARMON A., *Botany*...Botany Dept., O. S. U., Columbus
- '10. RUSH, R. C., *Conchology*.....Hudson

- '18. SAMPSON, HOMER C. (F '20), *Botany*.....O. S. U., Columbus
- '21. SAYRE, JASPER D. (F '22), *Botany*, Department of Botany, O. S. U., Columbus
- '97. SCHAFFNER, JOHN H. (F '20), *Botany*.....O. S. U., Columbus
- '13. SCHEAR, E. W. E., *Biology*.....107 W. Park, Westerville
- '07. SCHEFFEL, EARL R., *Geology*.....
Dept. of Geology, Univ. of West Virginia, Morgantown, W. Va.
- '24. SCHRADIECK, HENRY E., *Ichthyology, Limnology*, Urbana University, Urbana
- '19. SCHWEIKHER, F. P., *Nature Study, General Science, Agriculture, Botany, Zoology*.....1623 Compton Rd., Cleveland
- '16. SCOTT, ERNEST (F '20), *Pathology*, Medical College, N. Park St., Columbus
- '15. SEARS, PAUL B. (F '21), *Botany, Entomology*.....
Dept. of Botany, Univ. of Nebraska, Lincoln, Neb.
- '22. SECREST, EDMUND, *Forestry*.....Ohio Experiment Station, Wooster
- '01. †SELBY, A. D. (F '20), *Botany*...Ohio Agricultural Exper. Station, Wooster
- '22. SETTERFIELD, HUGH, *Zoology, Botany*.....Myers Hall, Springfield
- '14. SEYMOUR, RAYMOND JESSE (F '20), *Physiology, Zoology, Botany*...
Dept. of Physiology, O. S. U., Columbus
- '12. SHADLE, ALBERT, *Zoology*.....
Dept. of Biology, Univ. of Buffalo, Buffalo, N. Y.
- '11. SHARP, MRS. KATHARINE DOORIS, *Botany, Geology*.....London
- '08. SHATZER, C. G. (F '20).....1003 Woodlawn Ave, Springfield
- '13. SHIDELER, W. H. (F '20), *Geology*.....Miami University, Oxford
- '10. SHILLIDAY, C. L., *Zoology*.....Gettysburg, Pa.
- '15. SHUMAN, S. C., *Botany*.....Boughtonville
- '13. SHUMAN, W. L., *Botany*.....South Euclid
- '22. *SISSON, SEPTIMUS, (F '23), *Veterinary Medicine, Anatomy*.....
O. S. U., Columbus
- '21. SKAGGS, ERNEST B., *Psychology*.....
Dept. of Psychology, Univ. of Michigan, Ann Arbor, Mich.
- '19. SKINNER, CHARLES R., *Physics*.....334 N. Sandusky St., Delaware
- '12. SMITH, ALPHEUS W. ('22; F '22), *Physics*.....O. S. U., Columbus
- '22. SMITH, ALVA W., *Physics*.....O. S. U., Columbus
- '21. SMITH, ELLA THEA, *Botany, Zoology*.....P. O. Box 7, Salem
- '21. SMITH, ERNEST RICE, *Geology, Paleontology*.....
628 E. Walnut St., Greencastle, Ind.
- '22. SMITH, RUSSELL M., *Chemistry, Botany*.....69 Neal Ave., Newark
- '02. SNYDER, F. D., *Zoology, Ethnology*.....A. H. Babula
- '22. SPENCER, HERBERT, *Entomology, Zoology, Ecology*.....
Truck Crop Exp. Station, Box 881, Norfolk, Va.
- '18. SPOHR, CARL F. (F '20), *Medical Sciences*..Medical Dept., O. S. U., Columbus
- '12. STANLEY, CLYDE M., *Zoology*.....Damascus
- '21. STAUFFER, A. S., *Botany*.....University High School, Chicago, Ill.
- '05. STAUFFER, CLINTON R. (F '20), *Geology*.....
Univ. of Minnesota, Minneapolis, Minn.
- '03. STICKNEY, M. E. (F '20), *Botany*.....Denison University, Granville
- '22. STOCKDALE, PARIS B., *Geology*...Dept. of Geology, O. S. U., Columbus

† Deceased May 6, 1924.

* Deceased July 24, 1924.

- '20. STONE, JULIUS F., *General Science*.....Grandview, Columbus
- '15. STOUT, HARRY O., *Botany, Geology, Agriculture, Zoology*.....
Bowling Green High School, Bowling Green
- '08. STOUT, W. E. (F '20), *Chemistry, Ceramics, Geology*.....
291 E. Northwood Ave., Columbus
- '20. STOVER, ERNEST L., *Botany*.....
Eastern Illinois Normal College, Charleston, Ill.
- '09. STOVER, W. GARFIELD (F '20), *Botany, Plant Pathology*.....
O. S. U., Columbus
- '03. SWEZEY, OTTO H.....2048 Lanihuli Drive, Honolulu, Hawaii
- '23. SWINNERTON, ALLYN C., *Geology*.....Antioch College, Yellow Springs
- '19. TAYLOR, MRS. BAYARD, *Botany, Ornithology*.....West Jefferson
- '19. THOMAS, EDWARD S., *Ornithology*.....81 Ruggery Bldg., Columbus
- '15. THOMAS, ROY C. (F '23), *Botany, Zoology, Geology, Agr. Exp. Sta.*, Wooster
- '20. TIFFANY, LEWIS H. (F '23), *Botany*..Dept. of Botany, O. S. U., Columbus
- '24. TILFORD, PAUL E., *Botany, Chemistry*, Ohio Agricultural Exp. Sta., Wooster
- '21. TIPPPIE, WILLIAM A., *Physics*.....2145 W. 100th St., Cleveland
- '20. TODD, FRANK E., *Entomology, Zoology, Plant Pathology*.....
Arizona Commission of Agriculture and Horticulture, Yuma, Arizona
- '94. TODD, JOSEPH H., *Geology, Archeology*.....Christmas Knoll, Wooster
- '19. TOOPS, HERBERT A., *Psychology*..Dept. Psychology, O. S. U., Columbus
- '19. TOOPS, LAURA CHASSELL, *Psychology*..Dept. Psychology, O. S. U., Columbus
- '15. TRANSEAU, EDGAR N. (F '20), *Botany*.....O. S. U., Columbus
- '19. TRETTIEN, A. W., *Psychology*.....Toledo University, Toledo
- '12. TURNER, CLARENCE L. (F '20), *Zoology*..Beloit College, Beloit, Wis.
- '24. TUTTLE, W. W., *Physiology, Psychology*.....Bremen
- '12. UNNEWEHR, EMORY C., *Physics*.....Baldwin-Wallace College, Berea
- '15. VAN CLEVE, M. R., *Physical Geography, Botany*..542 Ardin Place, Toledo
- '21. Van HORN, FRANK R. (*F '22), *Geology*.....
Case School of Applied Science, Cleveland
- '23. VAN HORN, JESSE LOWER, *Chemistry, Physics*.....
1490 Roycraft Ave., Lakewood
- '24. VER STEEG, CARL, *Geology, Geography*.....324 Nold Ave., Wooster
- '15. VIVIAN, ALFRED (F '20), *Agriculture, Chemistry*....O. S. U., Columbus
- '04. WAITE, F. C. (F '20), *Anatomy, Zoology*.....1353 E. Ninth St., Cleveland
- '18. WALLER, A. E., (F '20), *Botany*.....O. S. U., Columbus
- '02. WALTON, L. B. (F '20), *Biology*.....Gambier
- '24. WARTERS, MARY, *Zoology, Entomology, Botany, Chemistry, Anatomy*....
Box 433, Rome, Ga.
- '24. WEATHERBY, BENJAMIN B., *Physics*.....University of Toledo, Toledo
- '21. WEBB, ROBERT FULTON, *Geology*....Dept. of Geology, O. S. U., Columbus
- '98. WEBB, R. J., *Botany*.....Garrettsville
- '19. WEISS, ALBERT P. (F '20), *Psychology, Biology*.....O. S. U., Columbus
- '11. WELLS, B. W. (F '21), *Botany*.....
North Carolina Agricultural College, Raleigh, N. C.

- Total membership, 372.

REPORT

OF

THIRTY-FOURTH ANNUAL MEETING

OF THE

Ohio Academy of Science

The Thirty-fourth Annual Meeting of The Ohio Academy of Science was held at the Ohio State University, Columbus, April 18 and 19, 1924, under the Presidency of Prof. Kirtley F. Mather. One hundred and fourteen members were registered as in attendance; fifty-nine new members were elected.

GENERAL PROGRAM.

FRIDAY, APRIL 18.

- 9:30 A. M.—Business Meeting.
- 10:30 A. M.—Reading of Papers in General Session.
- 2:00 P. M.—The Invitation Address by Dr. Albert P. Mathews, of the University of Cincinnati, on "How Shall We Measure the Quantity of Life?"
- 3:00 P. M.—Reading of Papers in Sectional Meetings.
- 6:30 P. M.—Annual Banquet, Ohio Union, followed by an address of welcome by Dean William McPherson, Ohio State University, with response by Dr. Edward L. Rice, Ohio Wesleyan University.
- 8:00 P. M.—Address by the President of the Academy, Prof. Kirtley F. Mather, Denison University, on "Geologic Factors in Organic Evolution," Campbell Hall Auditorium.

SATURDAY, APRIL 19.

- 9:00 A. M.—Adjourned Business Meeting.
- 10:30 A. M.—Reading of Papers in General Session and in Botany Section.
- 2:00 P. M.—Reading of Papers in Sectional Meetings and Demonstrations.

MINUTES OF BUSINESS MEETINGS.

The first business session was called to order by President Mather at 9:45 A. M. on Friday, April 18, 1924, and an adjourned session was held at 9:00 A. M. on the following day.

The President announced the appointment of the following committees for the meeting:

Committee on Membership—Dwight M. DeLong, Lewis H. Tiffany, Raymond J. Seymour, Harold E. Burt, Frederick C. Blake.

Committee on Resolution—Albert P. Weiss, E. L. Moseley, Edgar N. Transeau.

Committee on Necrology.—Herbert Osborn,

The following *Auditing Committee* was elected by the Academy: Geo. D. Hubbard and H. C. Beardslee.

The following *Nominating Committee* was elected by the ballot of the Academy: Raymond C. Osburn, Lewis H. Tiffany, Geo. D. Hubbard, Raymond J. Seymour, Harold E. Burt, Frederick C. Blake.

Report of the Secretary.

The following report by the Secretary was received and ordered filed.

COLUMBUS, O., April 18, 1924.

To the Ohio Academy of Science:

The year now closing marks a change, as you know, in the Secretariate of the Academy and your Secretary has the distinct conviction that he would be untrue to the real feelings of the members of the Academy, certainly to his own, if he were to allow this fact to pass unnoticed, even if such a thing were possible. Of course all present miss from its accustomed place the genial face of the former Secretary, Dr. Edward L. Rice. During the eleven years of faithful service Dr. Rice not only made a real contribution to the Academy but made himself so useful, so helpful, not to say indispensable, that in the minds of many of us the names "Ohio Academy of Science" and "Edward L. Rice, Secretary" are almost synonymous. But words are unnecessary: "His works do praise him."

It is only fair to say, also, that the work of the former Secretary did not end with the election of his successor, since upon him fell the duty, for example, of clearing up the odds and ends after the Annual Meeting at Oberlin in March, of preparing the Annual Report for the printer, of notifying newly-elected officers, members and fellows, of sending out copies of resolutions passed at the last Annual Meeting, and of preparing a report of the meeting for *Science*, etc. It was therefore early in July before the complete and formal transfer of the archives was made

and even then the former Secretary was not entirely released, as we have freely availed ourselves of his generous offer to lend assistance at any time and in any way possible.

Furthermore it should be stated that *the Secretariate was turned over in an excellent, up-to-date condition.*

The first item of more than routine importance to claim the attention of the new Secretary was the publication in pamphlet form of a memoir of the late Emerson McMillin, referred to on page 281 of the Proceedings of the Thirty-third Annual Meeting. Some 50 copies of this memoir were published by the Academy and distributed to the family and selected friends of Mr. McMillin.

The next item of general interest to the Academy was an invitation from the Ohio Forestry Association, through its Secretary, Prof. Edmund Secrest, inviting the members of the Academy to participate, as guests of the Association, in a field meeting at the John Bryan Park on September 21 and 22, 1923. This invitation was passed on to the members of the Academy in a letter dated September 8, 1923. Several members of the Academy availed themselves of this very courteous invitation, much to their pleasure and delight, and one or two of our members appeared on the program put on by the Association.

Owing to the sudden and unexpected passing away of our most distinguished member, the late Dr. T. C. Mendenhall, on March 22, 1924, the Secretary assumed the authority to call Dr. E. L. Rice over the long distance telephone and request him to represent the Academy at the funeral services held at Ravenna. This he consented to do and did. This action has since been approved by the Executive Committee.

The routine work of the office has been about as usual and very considerable; details have been taken care of as promptly and as efficiently as possible under the circumstances.

The generous, helpful cooperation of all the officers of the Academy has been a source of real inspiration throughout the year, for which hearty thanks are due and hereby recorded.

WILLIAM H. ALEXANDER, *Secretary.*

Report of the Treasurer for the Year 1923-1924.

The following report by the Treasurer was received and referred to the Auditing Committee whose report is appended.

To the Ohio Academy of Science:

The Treasurer submits the following report for the period from March 26, 1923, to April 2, 1924:

RECEIPTS.

Cash balance on hand March 26, 1923.....	\$766.05
Librarian's sales of publications.....	37.97
Interest on certificate of deposit.....	19.50
Members dues, paid through the A. A. A. S. and directly to the Treasurer.....	709.14
Total receipts.....	\$1,532.66

DISBURSEMENTS.

American Association for the Advancement of Science.....	\$ 76.00
Columbian Building and Loan Association, for deposit.....	750.00
H. C. Cowles, traveling expenses.....	30.00
E. L. Rice, secretarial and traveling expenses.....	10.78
Earl Sheffel, refund.....	2.00
Independent Print Shop.....	29.00
Spahr & Glenn, Printers.....	3.25
A. E. Kraus, Print Shop.....	32.00
Herbert Osborn, traveling expenses.....	13.50
Wm. Alexander, secretarial expenses.....	18.15
Eunice McCray, stenographic service.....	10.00
Helen M. Coleman, stenographic service.....	3.25
Total Disbursements.....	\$ 977.93
Cash balance on hand April 2nd, 1924.....	554.73
Assets—Certificate of deposit for.....	650.00
Total Assets.....	\$1,204.73

The original purchase of a certificate of deposit for \$750.00 was later reduced \$100.00 to pay the honorarium to the Academy Secretary. It will be noted that this item does not appear above. Cancelled checks and vouchers are herewith submitted with the books.

Dr. Burton E. Livingston, Permanent Secretary of the A. A. A. S., reported that the plan of having joint dues in the Academy and the A. A. A. S. payable through his office was working satisfactorily.

Respectfully submitted,

A. E. WALLER, *Treasurer.*

Books, checks and vouchers submitted and found to be correct.

GEO. D. HUBBARD,

H. C. BEARDSLEE,

Auditing Committee.

Report of the Executive Committee.

The following report of the Executive Committee was received and ordered filed.

COLUMBUS, O., April 18, 1924.

To the Ohio Academy of Science:

A meeting of the Executive Committee was held in Columbus on November 9, 1923, with all members present except the President, who because of absence from the State could not attend the meeting. By invitation Vice-President Barrows and Prof. Raymond C. Osburn were present, the former presiding over the meeting.

A letter was read from President Mather, extending greetings and good wishes and suggesting among other things that some action should be taken regarding the expenses of Prof. Herbert Osborn as the duly accredited representative of the Academy to the Leidy Commemorative Meeting to be held in Philadelphia on December 6, 1923. Thereupon the committee instructed the Treasurer to reimburse Professor Osborn for all necessary expenses incurred in this connection.

The Secretary was requested and authorized to make such arrangements as might seem wise in the establishing of temporary headquarters for the visiting members of the Ohio Academy at the annual meeting of the American Association for the Advancement of Science to be held in Cincinnati the latter part of December, 1923. This action was very satisfactorily carried out through the generous cooperation of members of the Academy living in Cincinnati.

At this meeting of the committee it was decided to accept the invitation of the Ohio State University to hold the Thirty-fourth Annual Meeting of the Academy at that institution. It was also agreed that the time should be "very near Easter" but the exact date was left for the Secretary to determine after some further investigations.

A second meeting of the Executive Committee was held in Columbus at the office of the Secretary last evening with all members present.

At this meeting forty applications for membership in the Academy were approved subject to final ratification by the Academy.

The Secretary placed before the committee a cordial invitation from the Faculty of the College of Wooster, heartily seconded by the staff of the Ohio Agricultural Experiment Station, to hold the next Annual Meeting of the Academy at Wooster. The committee decided to refer the invitation to the Academy for such action as it may see fit to take.

The following letter from Dr. Burton E. Livingston, Permanent Secretary, American Association for the Advancement of Science, written in reply to a letter inviting Dr. Livingston or some other officer of the A. A. A. S. to be present at the Annual Meeting of this Academy, was laid before the committee, viz.:

WASHINGTON, D. C., March 18, 1924.

DEAR MR. ALEXANDER:—I have your letter of March 10 and have read it with much interest. It is the plan of the American Association to have, whenever possible, a representative of the Association in attendance at each annual meeting of the affiliated academies. This was decided at the Cincinnati meeting. But the whole question of the arrangements with affiliated academies has recently come up again for discussion and we think it will be best not to begin naming official representatives for academy meetings till the Executive Committee has had opportunity to define the attitude of the Association in regard to affiliated academies in a manner clearer than has thus far been done. We are making a serious study of the whole problem of academy affiliation and it may be possible that some improvements can be introduced. When we do begin to send representatives to the academy meetings, those representatives should naturally have the whole matter clearly in mind, and that could not be the case at present. There will doubtless be important matters to be discussed with the several academies.

I hope you will understand from this why I feel that we should postpone till a later time our beginning to name official representatives for the academy meetings.

I should like nothing better than to come to your meeting myself and I hope to be able to do so next year, perhaps.

Thanking you, and with all good wishes for the great success of your meeting,

Yours very sincerely,

BURTON E. LIVINGSTON,
Permanent Secretary.

The following communication was received from Charles E. Deam, President of the Indiana Academy of Science, and referred to the Academy for action, viz.:

BLUFFTON, IND., April 9, 1924.

DEAR MR. ALEXANDER:—I am sorry I shall not be able to attend the meeting of the Ohio Academy of Science April 18 and 19.

I wish if you do so, you would extend a most cordial invitation to all members of the Ohio Academy of Science to meet with the Indiana Academy of Science at their spring meeting to be held at Marengo, Ind., May 15–17.

At this meeting those who wish may go through the Marengo Cave at Marengo, and on the second day may go through Wyandotte Cave, about 13 miles distant. The field trips will be very interesting to the botanist and the geologist. The leader of the botanical section is well acquainted with the area and will show such rare plants as *Isoetes Engelmannii*, *Smilax Bona-nox*, and many others that are extremely local. The geologists will be led by one who has walked the entire region and is well acquainted with it. Come in hiking clothes.

Yours most cordially,

CHAS. C. DEAM.

An invitation was read from the President and Secretary of The Franklin Institute, Philadelphia, Pa., to participate in the celebration on September 17, 1924, of the *Centenary* of the signing of the Act of Incorporation of the Institute, by the appointment of a representative; this invitation is also referred to the Academy for action.

An invitation was also read from the British Association for the Advancement of Science, inviting members of this Academy to attend its Annual Meeting to be held in Toronto from August 6 to 13, 1924. Your Executive Committee suggests the names of Dr. A. E. Waller and Dr. Edward L. Rice as delegates to this meeting.

Respectfully submitted,

WILLIAM H. ALEXANDER,
For the Committee.

Report of the Publication Committee.

The following report of the Publication Committee was received and ordered filed:

The Annual Report of the Thirty-third Meeting, Proceedings, Vol. VII, Part 8, contained 29 pages and was published November 26, 1923. The report minus the membership list was also published in the *Ohio Journal of Science*: 23: 209–234, 1923.

Respectfully submitted,

H. C. SAMPSON, *Chairman.*

Report of the Library Committee.

The following report of the Library Committee was received and ordered filed:

COLUMBUS, O., April 18, 1924.

To the Ohio Academy of Science:

The Library Committee begs to report that all duties devolving upon it have been discharged as promptly as possible.

The sale of publications during the year amounted to \$37.97. This amount has been turned over to the Treasurer of the Academy.

The Proceedings of the Thirty-third Annual Meeting, 1923, were received from the printer in December and copies were mailed to all members of the Academy and to the exchanges early in the year 1924.

The publications received by the Academy on exchange have been added to the sets filed in the University Library. The scientific sections of the library have been increased annually by the purchase of many important sets and the hope is expressed that more and more the University Library will serve as the center of scholarly research by members of the Academy.

Respectfully submitted,

C. W. REEDER,

For the Library Committee.

Report of the Trustees of the Research Fund.

The Trustees reported, orally, that owing to the very recent death of their Chairman, Dr. T. C. Mendenhall, who had full charge of the books and records pertaining to the work of the Board of Trustees and usually prepared the report, it had been impossible for the other members to prepare a written report in time for this meeting, or to work out the details of the plan recommended by Dr. Mendenhall and endorsed by the Academy at the last Annual Meeting (see page 282, Proceedings, Thirty-third Annual Meeting) regarding the investment of the Research Fund and the use of the income therefrom. The Board requested another year in which to prepare a report. The request was granted.

A preliminary examination of the bank accounts, made soon after the April, 1924, meeting of the Academy, shows the following: Bills to the amount of \$126.36 were paid subsequent to April 1, 1923, and additions from interest on bonds amounting to \$27.62 have been credited, leaving a cash balance of \$724.82, or a total resource with bonds of \$1,324.82.)

In this connection the Secretary read the following letter written by Dr. Mendenhall only three days before his death:

RAVENNA, O., March 19, 1924.

MY DEAR MR. ALEXANDER:

Yours of the 17th has reached me together with another communication from you of an earlier date, which I found awaiting me on my arrival from Columbus on last Saturday night. You are perhaps by this time aware that I have been in the City of Columbus for the last two weeks, the victim of the ingenuity and indefatigable zeal of the doctors.

who have been doing everything that they can for me, or rather, I should say to me and eventually for me.

However, the investigation with all that has gone along with it has fatigued me very much and I was glad to reach home Saturday night. Now this has been a painful and possibly serious affair with me, and therefore, you will see that I must at once abandon all attempts to do anything for the Academy of Science for some time to come.

I regret this very much as there are several things which should be looked after in regard to the Emerson McMillin Fund. Not one single transaction has taken place so the financial situation is precisely as I have reported plus, of course, the income from our invested funds, so it will be very easy to determine approximately what amount will be available on the 19th of April. I hope to be able to prepare something in the form of a report by that time.

Yours faithfully,

T. C. MENDENHALL.

Upon motion duly made and carried, the Trustees were instructed to conserve the income from the McMillin Fund during the ensuing year.

Report of the Committee on State Parks and Conservation.

The Chairman of the Committee, Prof. Herbert Osborn, stated that the committee had not succeeded in having any formal meetings as it is made up, very properly, of members scattered through the State and there had been no convenient occasion on which to get the members together. It is of interest to report, however, that there has been distinct progress in the matter of reservations for park, game refuge and forestry purposes which have materially extended the areas devoted to these purposes and which we may count as distinct advances. The Bryan State Park which includes part of the Clifton Gorge and which was mentioned in our last report as likely to be finally accepted by the State has now definitely become State property and is administered by the State Experiment Station, so that it may be counted as permanently devoted to park and reservation purposes and its scenic, biologic and geologic features preserved for future students.

At a meeting of the State Forestry Society last September, to which our members were invited, as pointed out in the Secretary's Report, we had an opportunity to observe the conditions and possibilities there under very favorable circumstances.

The Roosevelt Game Refuge, now embracing some 15,000 acres, was dedicated last fall and is already proving its value in stimulating interest and activity in the preservation of the native plants and animals of the region. Additional tracts have been secured for the state forests and these have distinct value as areas in which conditions will serve to perpetuate our native fauna and flora. The park system of Cleveland, which was visited with the kind guidance of Professor Fullmer, gives very encouraging evidence of a broad plan for the development of adequate park areas including some remarkably fine natural scenery and the preservation of natural conditions for plant and animal life.

The publication of the Naturalists Guide by the Ecological Society of America and for which the Ohio areas have been very carefully listed by Dr. E. Lucy Braun, is expected in the near future and will make available to our members a detailed list of tracts now reserved or which should be made into reservations when possible. There is a manifest interest in this subject in many of the states and great progress has been made in some of our sister states, notably New York and Iowa, and we may expect a growing appreciation of its importance and efforts of the Academy should be continued in order that the scientific aspects may receive proper attention.

This statement by the chairman of the committee was received as a report of progress and the committee continued.

Report of the Committee on Legislation.

The chairman of the Committee made an oral statement to the effect that in as much as the General Assembly failed to pass the bill (H. B. No. 400) that was before it at the time of our last meeting and as there has been no session of the Assembly since that time, the committee has not been able to do anything more than "watchful waiting." This statement was received as a report of progress and the committee continued.

. Election of Officers.

The following officers and committee members for 1924-25 were elected by the ballot of the Academy.

President—Prof. Edgar N. Transeau, Ohio State University, Columbus.

*Vice-Presidents:**Zoology*—Ralph V. Bangham, Wooster College, Wooster.*Botany*—Prof. Edmund Secrest, Ohio Agricultural Experiment Station, Wooster.*Geology*—Prof. G. W. Conrey, Ohio State University, Columbus.*Medical Sciences*—Prof. R. G. Hoskins, Ohio State University, Columbus.*Psychology*—Prof. F. C. Dockeray, Ohio Wesleyan University, Delaware.*Physical Sciences*—Prof. C. D. Coons, Denison University, Granville.*Secretary*—William H. Alexander, U. S. Weather Bureau, Columbus.*Treasurer*—Dr. A. E. Waller, Ohio State University, Columbus.*Elective Members of the Executive Committee*—Prof. C. G. Shatzer, Springfield; Prof. Bradley M. Patten, Cleveland.*Member Publication Committee*—Prof. Lewis G. Westgate, Delaware.*Trustee Research Fund*—Dr. Edward L. Rice, Ohio Wesleyan University, Delaware.*Member of Library Committee*—Prof. Frederick C. Blake, Ohio State University, Columbus.*Legislative Committee*—Wm. H. Alexander, Columbus; M. M. Metcalf, Oberlin; Paul M. Rea, Cleveland; Edward L. Rice, Delaware; L. B. Walton, Gambier.*Representatives on Editorial Board of Ohio Journal of Science:**Zoology*—Prof. R. A. Budington, Oberlin College, Oberlin.*Botany*—Prof. Bruce Fink, Miami University, Oxford.*Geology*—Prof. G. D. Hubbard, Oberlin College, Oberlin.*Medical Sciences*—Prof. F. C. Waite, Western Reserve University, Cleveland.*Psychology*—Prof. H. A. Aikins, Western Reserve University, Cleveland.*Physical Sciences*—Prof. S. J. M. Allen, University of Cincinnati, Cincinnati.*Election of Members.*

The following persons were regularly nominated and elected to membership in the Academy:

ALDERMAN, OVID A.; Botany, Zoology; 308 Bowman St., Wooster.

BARTHOLOMEW, PAUL S.; Botany, Entomology, Ornithology; R. F. D. No. 3, Sycamore.

BEARSS, ESTHER; Biology; Cochran Hall, Westerville.

BEAVER, WILLIAM C.; Zoology, Medical Sciences, Botany; Head of Department of Biology, Wittenberg College, Springfield.

BILSING, S. W.; Entomology, Zoology; College Station, Texas.

BUSCH, K. G. A.; Chemistry, Botany; Capital University, Columbus.

CAMP, WENDELL H.; Geology, Zoology; Otterbein College, Box 101, Westerville.

- CASKEY, MARION W.; Zoology; Ohio State University, Columbus.
- CONGER, ALLEN C.; Zoology; Darlington Road, Delaware.
- DEHUS, DELORES; Biology; 714 S. Main St., Ada.
- DICKERSON, BESSIE; Zoology, Medical Sciences; New Concord.
- DIETZ, DAVID; Astronomy, Physics; The Cleveland Press, Cleveland.
- EDWARDS, LINDEN FOREST; Zoology; Reynoldsburg.
- GAMBRELL, FOSTER LEE; Entomology, Zoology; Ohio State University, Columbus.
- GILLESPIE, J. S.; Geology; 1075 Madison Ave., Columbus.
- GOODWIN, HOWARD R.; Archaeology; Ohio State Archaeological and Historical Museum, Columbus.
- GOURLEY, J. H.; Horticulture; Wooster.
- HALL, SCHULER P.; Physics; Wooster College; Wooster.
- HARP, HUGH G.; Astronomy, Meteorology; Wittenberg College; Springfield.
- HEATH, A. B.; Physical Geography, Meteorology, Geology; 544 Franklin St., Hamilton.
- HEFNER, ROBERT A.; Zoology, Astronomy; 238 W. Tenth Ave., Columbus.
- HENDERSON, A. LEE; Psychology, Medical Sciences; 489 Maynard Ave., Columbus.
- HILKER, H. V.; Geology, Archaeology; 325 N. Third St., Hamilton.
- JOHNSON, H. M.; Psychology; Ohio State University; Columbus.
- JONES, MERLIN PERRY; Entomology, Botany; 89 Euclid Ave., Columbus.
- KAO, CHUNG KWAI; Botany; 101 W. Eighth Ave., Columbus (Permanent address: Hoking, Yunnan, China).
- LAFFLEUR, ALBERT; Geography, Geology, Meteorology, History; Box 357, Athens.
- LAMBORN, R. E.; Geology; Department of Geology, O. S. U.; Columbus.
- LEWIS, GEORGE; Electro and Radio Physics; Crosley Radio Corporation, Cincinnati.
- LINDSEY, A. W.; Entomology, Zoology; Denison University, Granville.
- LUSK, RALPH G.; Geology; Granville.
- MASON, CAPT. PAUL; Archaeology, Meteorology, Public Health; 271 S. Champion Ave., Columbus.
- MARTIN, CLARE; Chemistry, Physics; State Normal College, Bowling Green.
- MATHEWS, ALBERT P.; Biochemistry, Physiology; University of Cincinnati; 255 Loraine Ave., Cincinnati.
- MILLER, DAVID F.; Zoology; 1466½ Pennsylvania Ave., Columbus.
- MOON, M'DELLA; Botany, Zoology; 48 Seventeenth Ave., Columbus.
- MOSES, C. F.; Geology; Muskingum College; New Concord.
- OLSON, HENRY W.; Zoology; 356 Centner Ave., Columbus.
- ORR, GROVER L.; Chemistry, Physics; Capital University, 767 College Ave., Columbus.
- PALLISTER, JOHN C.; Entomology, Zoology; Cleveland Museum of Natural History, 2717 Euclid Ave., Cleveland.

- PATTERSON, EDNA; Zoology, Entomology, Botany, Astronomy; 130 W. Tenth Ave., Columbus.
- PETERSON, CHARLES J.; Botany, Horticulture; Peterson Nurseries Co., Wilmington.
- POLLITZ, LOUISE C.; Geology, Geography, Ecology; Cleveland Museum of Natural History, Cleveland.
- REEVES, PRENTICE; Psychology, Medical Sciences; 208 N. Sandusky St., Delaware.
- RICKEY, EDNA; Psychology, Medical Sciences; 53 Smith Place, Columbus.
- ROFKAR, WILLIAM F.; Zoology, Botany, Geology; 504 Beall Ave., Wooster.
- SCHRADIECK, HENRY E.; Ichthyology, Fish Culture; Urbana University, Urbana.
- TILFORD, PAUL E.; Botany, Chemistry; Ohio Agricultural Experiment Station, Wooster.
- TUTTLE, W. W.; Physiology, Psychology; Bremen.
- VER STEEG, CARL; Geology, Geography; 324 Nold Ave., Wooster.
- WARTERS, MARY; Zoology, Entomology, Botany, Chemistry, Anatomy; 130 W. Ninth Ave., Columbus.
- WEATHERBY, BENJAMIN B.; Physics; Toledo University, Toledo.
- WELTON, F. A.; Agronomy; Ohio Agricultural Experiment Station, Wooster.
- WHITE, GEO. W.; Geology; 86 E. Lincoln St., Westerville.
- WILSON, IRA T.; Zoology; Heidelberg University, Tiffin.
- YEE, MARTIN A.; Medical Sciences, Biology; University of the City of Toledo, Toledo.
- YOUNG, H. C.; Botany; Ohio Agricultural Experiment Station; Wooster.
- ZINKE, STANLEY G.; Meteorology, Ecology, Medical Sciences; 1814 Vine St., Cincinnati.
- ZINZON, W. A.; Physics; New Concord.

Report of the Committee on Election of Fellows:

The following report of the Committee on Election of Fellows was accepted and ordered filed:

COLUMBUS, O., April 18, 1924.

To the Ohio Academy of Science:

A meeting of the Committee on the Election of Fellows was held last evening in Columbus at the office of the Secretary. Eight members of the committee were present, one was represented by proxy, and two were absent without representation.

Of the candidates considered, fourteen received the necessary nine favorable votes and were declared elected. The fellows elected will be personally notified, and the list will be published in the Proceedings.

Respectfully submitted,

WILLIAM H. ALEXANDER, *Secretary.*
For the Committee.

The following is a list of those elected to fellowship:

RALPH V. BANGHAM	LAWRENCE L. HUBER
JOHN W. BARINGER	THOMAS G. PHILLIPS
SAMUEL WOOD CHASE	EDMUND SECREST
GUY W. CONREY	ERNEST RICE SMITH
FLOYD CARLTON DOCKERAY	PARIS B. STOCKDALE
H. A. GOSSARD	HERBERT ANDERSON TOOPS
ROY GRAHAM HOSKINS	CHARLES J. WILLARD

Resolutions.

The following resolutions were unanimously adopted by the Academy:

1. The Academy wishes to thank the members of the Local Committee and the officers of the Ohio State University for the efforts they have made and the courtesies they have extended toward making the Thirty-Fourth Annual Meeting of the Ohio Academy of Science a success.

2. The Academy wishes to express to Dr. Albert P. Mathews, Professor of Biochemistry at the University of Cincinnati, its appreciation of the special lecture on "How Shall We Measure the Quantity of Life?"

3. The Academy wishes to express its endorsement of the resolutions submitted to the United States Congress by the American Ecological Society, to set aside the Glacier Bay region as a National Monument.

Report of the Committee on Necrology.

The following report of the Committee on Necrology was adopted by the Academy and ordered filed:

MEMORIAL TO DR. THOMAS CORWIN MENDENHALL.

The Ohio Academy of Science mourns today a trusted leader and former president, Thomas Corwin Mendenhall. He was eminent in Physical Science as an investigator, a teacher, an expositor and an organizer. The Franklin Institute of Philadelphia in granting to him in 1918 the Franklin medal, "founded for the recognition of those workers in physical science, * * * * * whose efforts have done most to advance a knowledge of physical science" made their award "in recognition of his fruitful and indefatigable labors in physical research, particularly his contribution to our knowledge of physical constants and electrical standards." This was one of a long series of similar awards, crowning his fifty years of leadership in Science.

Born at Hanoverton, Ohio, October 4, 1841, and living till March 22, 1924, his life covered one of the most eventful periods of human history and his scientific career was coincident with many of the most striking developments of modern science.

His earliest scientific paper was published in 1870. For the succeeding thirty years his contributions to the leading scientific periodicals were frequent and important. The *Proceedings of the A. A. A. S.*, the *American Journal of Science*, *Popular Science Monthly*, *Science*, and the *U. S. Coast and Geodetic Survey*, were principal avenues of publication.

As the first professor of physics of the Ohio State University, the pioneer work of equipping and putting into service a laboratory for instruction and research fell to him. He began this work in 1873, the first man elected to the faculty of the newly organized institution.

In 1878 he accepted the task of organizing the Physics department of the Imperial University of Japan at Tokio. He also founded the meteorological observatory there. His research work in Japan included careful measurements of the gravitation constant at Tokio and on the summit of Fujiyama, a determination of the density of the earth and some very accurate work with a Rutherford grating on the lines of the sun's spectrum. The celebrated astronomer, Professor Young of Princeton, pronounced these results as extraordinary. He also helped found the Seismological Society of Japan, which has done more than any other organization to make seismology an exact science.

In 1881 he returned to this country and resumed his work at Ohio State University. In the following year he organized the Ohio State Weather Service. His activity in seismology continued after his return.

In 1884 he became professor in the U. S. Signal Corps at Washington and developed instruments for the study of earthquakes. He also started C. F. Marvin, a former student of his in Ohio and the present distinguished Head of the U. S. Weather Bureau, in this same line of work. Dr. Mendenhall also began at this time an elaborate study of atmospheric electricity.

In 1886 he became president of the Rose Polytechnic Institute. Though a capable administrator he somehow kept up his scientific investigations and published four or five scientific papers during his three years presidency. The National Academy of Sciences also published a large volume on his work during this period in atmospheric electricity.

In 1889 he was made Superintendent of the U. S. Geodetic Survey. He here developed the famous "Mendenhall half-second pendulum," which for more than 25 years continued to do extraordinarily accurate work in fifteen Survey stations, and is still relied upon for the most exact results. One of these instruments was carried to Alaska, repeatedly landed in a surf boat for observations and when brought back to Washington gave the same value for "g" that it had given before the journey, to one part in 5,000,000. The reports and bulletins of the Survey contain many of his papers between 1889 and 1894. He was also made Superintendent of Weights and Measures and achieved the important task of putting our national system of weights and measures upon a Metric basis.

In 1893 he was one of five eminent electricians (chosen by mail ballot of 150 leading electrical men) to represent the United States at the International Electrical Congress at Chicago. Differences of opinion

developed there threatened to make agreement upon definitions of the principal electrical units impossible. The Franklin Institute now exhibits a sheet of paper on which Dr. Mendenhall one evening wrote down definitions of the ampere, the volt and the ohm. These he presented next morning to the Chamber of delegates; and the definitions finally adopted are practically identical with his penciled memorandum.

In 1894 he began a seven year service as president of the Worcester Polytechnic Institute.

His work as an investigator and as an organizer of research was indeed notable, but he also had a most unusual gift for making the results of scientific work intelligible and interesting to popular audiences. As a consequence he has been for many years repeatedly called upon for memorial and dedicatory addresses. In 1892 he gave a Convocation Address at Johns Hopkins on "Measurements of Precision, considered in Their Relation to the Condition of Man," and the same year prepared the principal address for the dedication of the new Ryerson Laboratory of the University of Chicago. He gave two series of lectures at the famous Lowell Institute in Boston, one in 1882 and one in 1892. Also lectures at Cooper Union, New York and in Philadelphia, Baltimore and Washington. In 1887 he was made a member of the National Academy of Sciences. In 1888 he was president of the American Association for the Advancement of Science and won golden opinions as presiding officer of the Toronto Meeting. The next year he gave the retiring presidential address at Indianapolis. In 1894 he gave an address as retiring president of the Philosophical Society of Washington. Many of us here remember the delightful address he gave a few years ago as president of our own Ohio Academy of Science and his address on "Some Metrological Memories" before the Franklin Institute in 1918.

His work has been recognized by the award of numerous decorations and medals. From the Paris Exposition in 1900 he received a medal for a monograph entitled "Scientific, Technical and Engineering Education in the United States," from the Imperial Education Society of Japan in 1911 a gold medal. The same year he was decorated with the Order of Sacred Treasures, Japan. The receipt of the gold medal of the Franklin Institute has already been mentioned.

These are but a few of the high points of achievement in a notable career in physical science.

Mention has already been made of his pioneer work in equipping and developing the physical laboratory of the Ohio State University and this is but a small part of his service to that institution. His wise selection of equipment is shown in the fact that many of his early purchases are still giving good service on lecture table and in laboratory. His inspiring leadership of many of the early graduates, such as C. F. Marvin, W. C. Sabine, C. F. Scott, gave them a real start in their notable scientific careers.

Professor Derby, one of his confreres on the faculty in the 80's, has written concerning his important part in determining the educational policy of the institution as follows: "In every faculty certain members are conceded leadership. It soon became plain to me that in questions of

common University concern we usually followed Dr. Mendenhall. In the field of our educational policy he exercised a directive mind. Other professors keen and able in their several subjects, were less attentive to the interests of the institution as a whole, or too individualistic to secure agreement with their suggestions. We were fully awake to the trend of various propositions brought before us and our discussions, though usually courteous, were earnest and now and then sharp in tone. A determination that the work of the institution should be exacting and of high quality was always evident, and any suspected failure to maintain that quality occasioned sharp criticism. In the maintenance of these high standards. Dr. Mendenhall was foremost and his pungent wit seldom missed its mark. When later he withdrew from the University to enter a different scientific field his former colleagues deplored the loss of a beloved comrade, notable scientist and leader in education, but followed his brilliant career with affectionate admiration."

For many years following 1901 a break in health forced him to retire from active scientific and educational work. It was with great satisfaction therefore that some of us heard in June, 1919, that the Governor had appointed him to be a Trustee of the Ohio State University, on the first faculty of which he had served so efficiently many years before. His wise leadership soon caused his election as Chairman of the Board, a position which he greatly honored. His interest in the University never lagged and his faith in its future was evidenced in many ways. One of his last acts was to sign the diplomas for the graduates of the winter quarter of 1924.

In the year 1920, on the occasion of the celebration of the fiftieth anniversary of the founding of the University, Dr. Mendenhall gave to the University a sum of money for the endowment of a gold medal to be known as the Joseph Sullivant Medal. This medal is to be awarded at five year intervals to "that son or daughter of the University who shall have done or have completed, within the five-year period since the last award, a really notable piece of work in either the Liberal, the Fine, or the Mechanic Arts, the pure or applied Sciences, including the various branches of Engineering." The first award was made in 1923 to Mr. Benjamin Garver Lamme, of the Class of 1888.

Dr. Mendenhall's active connection with our Ohio Academy of Sciences began shortly after his return to Ohio in 1912 and he has been a devoted and helpful member interested in promoting its every interest. Almost as soon as he had acquired membership he was elected President, a quite unusual proceeding. This occurred at the Oberlin meeting, 1913, and he served for the year 1914 with such skill and enthusiasm as to give us all renewed courage and confidence in the mission of the Academy.

As Trustee and for a number of years Chairman of the Research Fund of the Academy, serving from 1916 to his death, he was greatly interested in the use of the Academy funds for research and used rare discrimination in the assignment of its limited income to secure the largest benefits in the encouragement of research.

He was particularly interested in the securing of larger support for the Academy and served most faithfully on the legislative committee

which sought state support for Academy activities, especially for publication of the results of scientific studies. He expressed the hope and it was one of his cherished projects that the Academy might sometime be provided with a suitable building for its permanent home and as a center of its activities and that it might serve in some very vital way for the promotion of the scientific functions of the state. His recommendations and suggestions are matters of recent record and may well serve us in our future efforts for the development of scientific activities in the state.

With all these relations the thing that we feel most deeply today is the friendly nature of his work among us. With a most unusual experience in scientific development of more than a half century, a remarkable acquaintance with scientific work and workers he possessed such a broad appreciation of the work and accomplishment of others and such a friendly attitude toward even the most humble worker in the field of science that his presence and interest were a constant source of encouragement. With a multitude of honors and distinctions he was still one of the most democratic and unassuming of men. With a wealth of achievement, seldom equalled, to his credit he was ever modest in reference to the importance of his own contributions to science. He was a man whom we could admire and love, whose friendly greeting will be missed but whose memory will be cherished as representing the finest spirit of scientific devotion, achievement and fellowship. We have recorded our esteem and appreciation of his worth in such honors as it was in our power to give. We have now to place on record, as our lasting recognition of his leadership, this declaration of our high regard for his service, our great indebtedness for his many activities in the Academy and our tribute to his memory as a friend and fellow worker. His fine accomplishments and inspiring personality will long remain with us as a beautiful memory.

HERBERT OSBORN. *Chairman,*
A. D. COLE,
WM. MCPHERSON,
Committee on Necrology.

Meeting Place, 1925.

President Mather laid before the Academy the invitation from Wooster College to meet in Wooster next year. Mr. W. C. Devereaux stated that he was fully prepared and authorized to extend an invitation to the Academy to meet in Cincinnati next year but inasmuch as Wooster seemed to have a superior claim in that the Academy had never met in that city, he would withhold his invitation until some future time in favor of Wooster. Whereupon the Academy by vote declared itself in favor of accepting the invitation from Wooster College but left the final decision as to the next meeting place in the hands of the Executive Committee.

Change in Name of Section.

Upon motion of Mr. W. C. Devereaux, seconded by Prof. F. C. Blake, the Academy approved the changing of the name of the section heretofore known as *The Section of Physics* to that of *The Section of Physical Sciences*.

At the suggestion of Dr. E. L. Rice it was unanimously agreed that the passing of this motion would serve also as notice of such changes in the Constitution and By-Laws as might be necessary to conform to said motion.

Delegates to the Toronto Meeting of the B. A. A. S.

By motion duly made and seconded the Academy unanimously approved the recommendation of the Executive Committee that Dr. A. E. Waller and Dr. Edward L. Rice be designated as the duly accredited delegates of this Academy to the Annual Meeting of the British Association for the Advancement of Science to be held in Toronto, August 6-13, 1924.

Scientific Sessions.

The following is the complete scientific program of the meeting:

PRESIDENTIAL ADDRESS.

Geologic factors in social evolution.....KIRTLEY F. MATHER

PUBLIC LECTURE.

How shall we measure the quantity of life?.....ALBERT P. MATHEWS

PAPERS.

1. Laboratory exercises in atomic structure. (15 min.),
WM. LLOYD EVANS AND JESSE E. DAY
2. The valley of ten thousand smokes in 1923. (20 min., lantern),
KIRTLEY F. MATHER
3. Tantalum: The newest metal contributed by science to industry. (30 min.),
JAMES R. WITHROW
4. Recent work in endocrinology. (30 min., lantern).....R. G. HOSKINS
5. The weather. (15 min.).....W. C. DEVEREAUX
6. Pressure and life. (15 min.).....STANLEY G. ZINKE
7. Glare: With demonstrations. (30 min.).....F. C. CALDWELL
8. Medical education in Colonial America. (15 min.).....F. C. WAITE
9. The relation of fish production to forestation. (10 min.),
RAYMOND C. OSBURN
10. The application of radio in distance determination. (20 min.),
GEORGE LEWIS
11. A hydrogen sulfide delivery system. (7 min.).....JESSE E. DAY
12. Respiration in the orthoptera. (15 min.).....M. O. LEE
13. The nutrition of *Euglena gracilis*. (10 min.).....W. J. KOSTER
14. Pest hunts in Wood County. (10 min.).....E. L. MOSELEY

15. The development of the intestinal coiling of the minnow (*Campostoma anomalum*). (10 min., lantern).....W. C. KRAATZ
16. Morphology of *gigantorhynchus* (*ancanthocephala*). (10 min.),
M. W. CASKEY
17. The periodical cicada in Ohio. (20 min., lantern).....H. A. GOSSARD
18. An Ohio record for the dragonfly (*Tachopteryx thoreyi*). (5 min.),
JAMES S. HINE
19. Parasites of the black bass. (10 min.).....R. V. BANGHAM
20. Habits of the common water snake, particularly in its relation to fish.
(5 min.).....F. A. HANAWALT
21. New terms suggested to designate the various modes of nutrition in
organisms. (5 min.).....W. J. KOSTIR
22. Recent mammal records in Ohio. (5 min.).....JAMES S. HINE
23. Ecologic notes on some homoptera of the southwest. (10 min., lantern),
HERBERT OSBORN
24. The early differentiation of the longitudinal zones in the neural plate of
rana. (10 min.).....R. A. KNOUFF
25. Two new hereditary tumors in *drosophila*. (15 min.).....IRA T. WILSON
26. The primitive lines in *amblystoma*. (15 min.).....F. L. LANDACRE
27. Comparisons of protozoan nuclei. (20 min.).....MAYNARD M. METCALF
28. A study of comparable developmental stages in chick and pig embryos.
(10 min.).....B. M. PATTEN
29. The differentiation of the epichordal and prechordal portions of the
brain in *amblystoma*. (10 min.).....R. C. BAKER
30. The spherical blackboard in the teaching of embryology. (5 min.),
EDWARD L. RICE
31. The effect on basal metabolism of ingested adrenalin chloride. (15 min.),
FRED A. HITCHCOCK
32. Heredity defects of the human hands, with special reference to symph-
alangism. (15 min.).....R. A. HEFNER
33. A novel type of symphalangism (?) or hypodactyly (?). (10 min.),
O. L. INMAN
34. Some practical and theoretical aspects of lubricating oil emulsions as a
scalecide. (10 min.).....L. L. HUBER
35. Interaction of the genes in the production of eye color in *drosophila*.
(10 min.).....W. P. SPENCER
36. The development of forestry practice. (25 min., lantern),
EDMUND SECREST
37. Botany: Opportunity. (15 min.).....MAXIMILIAN BRAAM
38. Present tendencies in high school biological courses. (10 min.),
WILLIAM E. NIEHAUS
39. Some Ohio inter morainal lakes and lake beds. (10 min., lantern),
GEORGE D. HUBBARD
40. The age of the glacial drift in Licking County, Ohio. (10 min.),
RALPH G. LUSK
41. Some glacial pebbles and cobbles found beyond the glacial boundary in
Muskingum and Guernsey counties. (10 min.).....C. F. MOSES
42. The composition of the Illinoian drift in Clermont County, Ohio. (5 min.),
G. W. CONREY
43. Drainage changes in the Warren-Youngstown-Sharon-New Castle areas.
(20 min.).....G. F. LAMB
44. Erosion levels in the Colorado Plateau. (15 min.).....ROBERT F. WEBB
45. Differences in the form of species usually regarded as common to North
America and Europe. (15 min.).....AUGUST F. FOERSTE
46. Plant life in ordovician and silurian times. (10 min.).....AUGUST F. FOERSTE
47. The positions occupied by orthoceroids while alive. (10 min.),
AUGUST F. FOERSTE
48. An amphibian trail from Pottsville formation. (5 min.).....G. F. LAMB
49. The Cleveland shale fishes of northern Ohio. (25 min., lantern).....J. E. HYDE
50. Two recent papers on the earth's interior. (15 min.).....WALTER H. BUCHER

51. The importance of water conditions on the shallow oil sands of Ohio. (15 min.).....KENNETH COTTINGHAM
52. The structure of the Clinton sandstone in Ohio and its relation to oil and gas accumulation. (15 min.).....ROBERT LOCKETT
53. Clinton sand structure of northern Ohio in its relation to production. (15 min.).....A. W. MELHORN
54. A structural feature of Wood County, Ohio. (10 min.)...J. ERNEST CARMAN
55. The decline of mining activity in Colorado. (30 min., lantern),
FRANK R. VAN HORN
56. The glass sands of Ohio. (10 min.).....J. A. BOWNOCKER
57. Bacterial precipitation in fresh water. (15 min., lantern),
ALLYN C. SWINNERTON
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59. Some broader correlations of the Richmond. (15 min., lantern),
W. H. SHIDELER
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62. Formation and structure of dental enamel. (15 min.)...SAMUEL W. CHASE
63. Status of the occupational disease question in Ohio, based on official figures. Present tendencies. (15 min., lantern)...EMERY R. HAYHURST
63. Recent studies on food accessories in a legume. (10 min.)...H. H. M. BOWMAN
64. Effect of basal metabolism of adrenalin by mouth. (10 min.),
F. A. HITCHCOCK
65. Factors that influence the knee jerk. (15 min.).....W. W. TUTTLE
66. Effect of adrenalin on the temperature of the brain. (10 min.),
W. P. SPENCER AND M. W. CASKEY
67. Relations of adrenals to bodily activities of the rat. (12 min.),
E. P. DURRANT
68. The effects of syphilis on dentition and on tooth structure. (15 min.),
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69. The nutritive value of a little-known bean. (10 min.)....H. H. M. BOWMAN
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FLORENCE MATEER
72. Psychological method of studying. (30 min.).....HAROLD E. BURTT
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74. Utilizing college records, including appointment blanks to predict after-college success of students. (15 min.).....LAURA CHASSEL TOOPS
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O. R. CHAMBERS
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78. The development of bisporangiate flowers in *Sagittaria latifolia*. (8 min.),
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79. A case of teratological inflorescence in alsike clover. (8 min.), FREDA DETMERS
80. Some new heritable characters of corn found in the culture at Ohio State University. Introduced by W. G. Stover. (10 min., lantern),
MARION T. MEYERS
81. Studies of variation in the fleshy fungi. (15 min.).....H. C. BEARDSLEE
82. The trend of investigation in plant growth. (20 min.).....H. C. SAMPSON
83. The change of opposite to alternate phyllotaxy in hemp by means of photoperiodism. (10 min.).....JOHN H. SCHAFFNER
84. The physiology of stomata. (20 min., lantern).....J. D. SAYRE
85. The diffusion of water-vapor through small openings. (20 min., lantern),
J. D. SAYRE
85. Water transfer in plant cells. (10 min.).....H. M. BENEDICT
86. The nutrition of *Euglena gracilis*. (10 min.).....W. J. KOSTIR
87. Some filamentous algae from Iowa. (10 min., lantern)....L. H. TIFFANY
88. The zygneales. (15 min.).....E. N. TRANSEAU

89. The peculiar flora of the sand region west of Toledo. (10 min.),
E. L. MOSELEY
90. The distribution of the pine in Ohio. (20 min., lantern).....FOREST DEAN
91. The economic features of the yellow poplar in Ohio. (15 min., lantern),
O. A. ALDERMAN
92. Progress report on plantings on the slope of the dams in the Miami Conservancy District. (25 min., lantern).....A. E. WALLER
93. Observations of a plant collector on the Island of Hainan. (By invitation). Introduced by A. E. Waller. (30 min., lantern)...F. A. McCLURE
94. The uredinales of Ohio. (Preliminary). (10 min.).....W. G. STOVER
95. The relation of weather conditions to the development of apple scab at Columbus in 1923. (12 min., lantern).....HOWARD W. JOHNSON
96. The infection period of apple blotch in central Ohio in 1923. (8 min., lantern).....CURTIS MAY
97. The relation of *Fusarium moniliforme* to the ear, stalk and root-rot of corn. Introduced by W. G. Stover. (10 min., lantern)...D. P. LIMBER
98. Studies of toxin production in the fusarium wilt of tomato. Introduced by W. G. Stover. (10 min.).....IVAN E. MASSAR
99. A bud sport in pelargonium accompanied by the loss of two chromosomes. (Read by title).....PAUL B. SEARS

DEMONSTRATIONS.

- a. Yellow poplar wood.....O. A. ALDERMAN
- b. Corn.....MARION T. MYERS
- c. Lower jaw of a boar showing tusks.....WILLIAM E. NIEHAUS
- d. Water snake (*Tropidonotus fasciatus*) in the act of swallowing a creek sucker.....F. A. HANNAWALT
- e. Skeleton mount of common mole (*Scalopus aquaticus machrinus*). W. H. CAMP
- f. Plaster cast of earthworm (*Lumbricus terrestris*). Cross section,
HENRY OLSON
- g. Examples of certain homoptera of the Southwest, with photographs of their habitats.....HERBERT OSBORN
- h. Activity cages.....E. P. DURRANT
- i. The structure of dental enamel.....SAMUEL W. CHASE
- j. A novel form of symphalangism, or hypodactyly.....ONDESS L. INMAN
- k. A new type of physiographic map.....KIRTLLEY F. MATHER

PROCEEDINGS
OF THE
OHIO
ACADEMY OF SCIENCE

AFFILIATED WITH THE
AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE

VOLUME VII, PART TEN

Annual Report
Thirty-Fifth Meeting

ANNUAL REPORT
OF THE
OHIO ACADEMY OF SCIENCE
Thirty-Fifth Meeting
1925

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Incorporated 1892

Affiliated with the American Association for the Advancement of Science

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- '15. STOUT, HARRY O., *Botany, Geology, Agriculture, Zoology*.....
Bowling Green High School, Bowling Green
- '08. STOUT, W. E. (F '20), *Chemistry, Ceramics, Geology*.....
291 E. Northwood Ave., Columbus
- '20. STOVER, ERNEST L., *Botany*.....
Eastern Illinois Normal College, Charleston, Ill.
- '09. STOVER, W. GARFIELD (F '20), *Botany, Plant Pathology*.....
O. S. U., Columbus
- '25. SWENSON, ENGELBREKT A., *Physiology, Anatomy*.....
Western Reserve University, Cleveland
- '03. SWEZEY, OTTO H.....2048 Lanihuli Drive, Honolulu, Hawaii
- '23. SWINNERTON, ALLYN C., *Geology*.....Antioch College, Yellow Springs
- '19. TAYLOR, MRS. BAYARD, *Botany, Ornithology*.....West Jefferson
- '25. TERWILLIGER, CHARLES VAN ORDEN, *Physical Sciences*..O. S. U., Columbus
- '25. THIESSEN, NORMAN W., *Chemistry, Biology*..1491 Lakeland Ave., Lakewood
- '19. THOMAS, EDWARD S., *Ornithology*.....81 Ruggery Bldg., Columbus
- '15. THOMAS, ROY C. (F '23), *Botany, Zoology, Geology*, Ohio Agr. Exp....
Sta., Wooster
- '25. THOMPSON, OSCAR E., *Zoology, Botany*.....42 Rice St., Alliance
- '20. TIRFANY, LEWIS H. (F '23), *Botany*..Dept. of Botany, O. S. U., Columbus
- '24. TILFORD, PAUL E., *Botany, Chemistry*..Ohio Agricultural Exp. Sta., Wooster
- '20. TODD, FRANK E., *Entomology, Zoology, Plant Pathology*.....
Arizona Commission of Agriculture and Horticulture, Yuma, Arizona
- '94. TODD, JOSEPH H. (F '25), *Geology, Archaeology*, Christmas Knoll, Wooster
- '19. TOOPS, HERBERT A., *Psychology*...Dept. Psychology, O. S. U., Columbus
- '19. TOOPS, LAURA CHASSELL, *Psychology*...Dept. Psychology, O. S. U., Columbus
- '15. TRANSEAU, EDGAR N. (F '20), *Botany*.....O. S. U., Columbus
- '19. TRETTIEN, A. W., *Psychology*.....Toledo University, Toledo
- '25. TRIESCHMANN, JACOB E., *Chemistry*.....28 W. Davis St., Tiffin
- '12. TURNER, CLARENCE L. (F '20), *Zoology*..Beloit College, Beloit, Wis.

- '24. TUTTLE, W. W., *Physiology, Psychology*.....Bremen
- '12. UNNEWEHR, EMORY C., *Physics*.....Baldwin-Wallace College, Berea
- '15. VAN CLEVE, M. R., *Physical Geography, Botany*...542 Ardin Place, Toledo
- '21. VAN HORN, FRANK R. (F '21), *Geology*.....
Case School of Applied Science, Cleveland
- '23. VAN HORN, JESSE LOWER, *Chemistry, Physics*.....
1490 Roycraft Ave., Lakewood
- '24. VER STEEG, CARL, *Geology, Geography*.....324 Nold Ave., Wooster
- '15. VIVIAN, ALFRED (F '20), *Agriculture, Chemistry*.....O. S. U., Columbus
- '01. WAITE, F. C. (F '20), *Anatomy, Zoology*.....1353 E. Ninth St., Cleveland
- '18. WALLER, A. E. (F '20), *Botany*.....O. S. U., Columbus
- '02. WALTON, L. B. (F '20), *Biology*.....
Cincinnati
- '24. WARTERS, MARY, *Zoology, Entomology, Botany, Chemistry, Anatomy*....
Box 433, Rome, Ga.
- '21. WATSON, A. C., *Psychology*.....Marietta College, Marietta
- '25. WATSON, S. A., *Biology*.....Wilmington College, Wilmington
- '24. WEATHERBY, BENJAMIN B., *Physics*.....University of Toledo, Toledo
- '21. WEBB, ROBERT FULTON, *Geology*.....Dept. of Geology, O. S. U., Columbus
- '08. WEBB, R. J., *Botany*.....Garrettsville
- '19. WEISS, ALBERT P. (F '20), *Psychology, Biology*.....O. S. U., Columbus
- '11. WELLS, B. W. (F '21), *Botany*.....
North Carolina Agricultural College, Raleigh, N. C.
- '13. WELLS, G. R. ('19; F '20), *Psychology*...11 Church St., Wethersfield, Conn.
- '21. WELTON, F. A., *Agronomy*...Ohio Agricultural Experiment Station, Wooster
- '91. WERNER, WILLIAM C. ('22), *Botany*.....422 N. St. Clair St., Painesville
- '93. WERTHNER, WILLIAM B. (F '20), *Botany*.....1525 Riverside Drive, Dayton
- '01. WESTGATE, LEWIS G. (F '20), *Geology*.....Delaware
- '25. WESTHAFFER, W. R.College of Wooster, Wooster
- '22. WHIPPLE, RALPH W., *Geology, Mineralogy, Paleontology, Anthropology*...
Marietta College, Marietta
- '21. WHITE, GEORGE W., *Geology*.....86 E. Lincoln St., Westerville
- '18. WICKLIFF, E. L. (F '23), *Zoology, Ornithology*.....
Dept. of Zoology and Entomology, O. S. U., Columbus
- '25. WIEBE, ABRAHAM H., *Biology*.....Bluffton
- '25. WILCOX, R. B., *Botany*.....Wooster
- '22. WILLARD, C. J., *Agronomy, Botany*.....O. S. U., Columbus
- '25. WILLIAMS, C. G., *Botany*...Ohio Agricultural Experiment Station, Wooster
- '21. WILLIAMS, R. D., *Philosophy, Psychology*.....
Dept. of Philosophy, O. S. U., Columbus
- '13. WILLIAMS, SAMUEL R. (F '20), *Physics*.....154 Forest St., Oberlin
- '03. WILLIAMS, STEPHEN R. (F '20), *Biology*.....300 E. Church St., Oxford
- '97. WILLIAMSON, E. B., *Entomology*.....Bluffton, Ind.
- '24. WILSON, IRA T., *Zoology*.....Heidelberg University, Tiffin
- '15. WITHROW, JAMES R. (F '20), *Chemistry, Mineralogy*...O. S. U., Columbus
- '20. WURDACK, MARY E., *Botany*.....29 Twelfth Ave., Columbus

- '21. YEE, MARTIN A., *Medical Sciences, Biology*.....
Canton Christian College, Canton, China
- '03. YORK, HARLAN H., *Botany*...West Virginia Univ., Morgantown, W. Va.
- '21. YOUNG, HERMAN H., *Psychology, Educational Research*.....
Indiana University, Bloomington, Ind.
- '21. YOUNG, H. C., *Botany*...Ohio Agricultural Experiment Station, Wooster
- '03. YOUNG, R. A., *Botany*.....Box 278, Brooksville, Fla.
- '21. ZINKE, STANLEY G., *Meteorology, Ecology, Medical Sciences*.....
1814 Vine St., Cincinnati
- '21. ZINZOW, W. A., *Physics*.....New Concord

Total membership, 396.

REPORT

OF

THIRTY-FIFTH ANNUAL MEETING

OF THE

Ohio Academy of Science

The Thirty-fifth Annual Meeting of the Ohio Academy of Science was held at the College of Wooster, Wooster, April 3 and 4, 1925, under the Presidency of Dr. Edgar N. Transeau. Something over one hundred members registered as in attendance; forty-six new members were elected, making a total membership at the close of the meeting of 396.

GENERAL PROGRAM.

FRIDAY, APRIL 3.

- 9:30 A. M.—Business Meeting.
- 10:30 A. M.—Reading of Papers in General Session.
- 1:30 P. M.—The Invitation Address by Prof. C. G. Williams, Director Ohio Agricultural Experiment Station, Wooster, on "The Work of the Ohio Agricultural Experiment Station."
- 2:30 P. M.—Reading of Papers in Sectional Meetings.
- 6:30 P. M.—Annual Banquet, Kenarden Lodge, followed by an address of welcome by President C. F. Wishart of The College of Wooster.
- 8:00 P. M.—Address by President Transeau, Taylor Hall, on "Accumulation of Energy by Plants."

SATURDAY, APRIL 4.

- 8:00 A. M.—Adjourned Business Meeting.
- 9:00 A. M.—Reading of Papers in General Session.
- 10:30 A. M.—Inspection of Orchards and Horticultural Work at The Ohio Agricultural Experiment Station under leadership of Vice-President Secrest.
- 11:00 A. M.—Reading of Papers in Zoology Section and in Joint Session of Geology and Physical Sciences Sections.
- 1:30 P. M.—Field Trip to Forest Arboretum on Grounds of The Ohio Agricultural Experiment Station under the leadership of Vice-President Secrest, Botany Section.

MINUTES OF BUSINESS MEETINGS.

The first business session was called to order by President Transeau at 9:50 A. M., on Friday, April 3, 1925, in the Auditorium of Taylor Hall. An adjourned session was held at the same place at 8:00 A. M. on the following day.

The President announced the appointment of the following committees for the meeting:

Committee on Membership—Geo. D. Hubbard, Chas. H. Otis, Clifford R. Cutright.

Committee on Resolutions—L. B. Walton, J. H. Schaffner, Carl Ver Steeg.

Committee on Necrology—F. O. Grover, John A. Bownocker.

The following *Auditing Committee* was elected by the Academy: Lynds Jones and S. R. Williams.

The following *Nominating Committee* was elected by the Academy by ballot: Raymond C. Osburn, J. Ernest Carman, E. L. Fullmer, Samuel W. Chase, F. C. Dockeray, L. W. Taylor.

Report of the Secretary.

The following report by the Secretary was received and ordered filed.

WOOSTER, O., April 3, 1925.

To the Ohio Academy of Science:

The duties of the Secretary were, as in past years, largely of a purely routine character. These were taken care of with the greatest possible dispatch. Among the transactions that seem to be of sufficient importance to warrant their review at this time may be mentioned the following:

Certificates of election to fellowship in the Academy were sent to all those thus honored at the Annual Meeting in 1924.

A brief report of the Thirty-fourth Annual Meeting of the Academy and a copy of the report of the Committee on Necrology were sent to *Science*; the former appeared in the issue of May 23, 1924, pages 470-472.

Information regarding the history and organization of the Ohio Academy of Science together with a copy of our Constitution and By-Laws was sent to applicants in two or three states where the organization of an academy was under consideration.

The following letter received by the Secretary speaks for itself:

TORONTO, SUNDAY, August 10, 1924.

DEAR MR. ALEXANDER:

I do not wish to let today pass without telling you how much I am enjoying my visit here and how heartily I appreciate having been sent by the Academy.

There are quite a number of Ohioans here, so one could not feel strange. But if there were none, the easy, informal way in which things are planned and carried out prevents any shyness or stiffness. To me the meetings seem better organized than our own just from that very standpoint—but this is merely a personal opinion.

Academy members who are here include R. C. Osburn, F. C. Blake, Alpheus Smith, A. P. Weiss, E. L. Rice and his father from Conn. Wesleyan, B. W. Wells, who is now in North Carolina but who still is a member of the Academy, Dr. Clare Martin of Bowling Green, and Albert Shadle. There may be others but I have not run into them.

The botanists' meetings have been splendid; a good many excursions are planned. I was much surprised when out of a clear sky my name was called to take part in the opening discussion on movement of food and water in plants. The president evidently remembered me from my visit to England in 1921.

Sincerely,

A. E. WALLER.

In August, 1924, the Academy received a formal invitation to be represented at the inauguration of Robert Ernest Vinson, President of Western Reserve University, on October 9, 1924. Thereupon the Secretary wrote to Dr. Dayton C. Miller, Case School of Applied Science, Cleveland, asking him to serve as the duly accredited delegate of the Academy and he very kindly consented to do so. Doctor Miller's report follows:

CLEVELAND, O., Oct. 24, 1924.

Mr. W. H. Alexander, Secretary,

The Ohio Academy of Science, Columbus, Ohio.

MY DEAR MR. ALEXANDER:

In accordance with your appointment of October 1, 1924, I attended the inauguration of Robert E. Vinson as President of Western Reserve University on October 9, 1924. I registered officially as the Representative of *The Ohio Academy of Science* and signed the formal register of delegates. I attended the ceremony of inauguration and the banquet in this capacity, and expressed the greetings of *The Ohio Academy of Science* to the officials of the University.

I am enclosing a printed program of the exercises in which you will find *The Ohio Academy of Science* listed as participating in the occasion. I am sure the University appreciated the kindness and interest *The Ohio Academy of Science* took in this connection. With kindest regards, I am,

Yours very truly,

DAYTON C. MILLER.

The copy of the program sent by Doctor Miller is on file with the Secretary.

The Secretary was present to represent the Academy in the Council of the American Association for the Advancement of Science at the Washington, D. C., meeting. While there, the Secretary together with the Treasurer, participated in a conference of representatives from the various state academies called by Dr. Burton E. Livingston, Permanent Secretary of the A. A. A. S., for the purpose of going over and thrashing out the whole question of affiliation between the Association and the academies. We understand the Treasurer is prepared to give the Academy a complete digest of this whole matter together with a statement of the final action taken by Council of the A. A. A. S.

In December last, we received a letter from Mr. Ovid M. Butler, the Executive Secretary of The American Forestry Association, Washington, D. C., earnestly soliciting the endorsement of this Academy of an effort to secure through appropriate legislation National forest lands in

the Eastern half of the country. This matter is now presented to the Academy for its action.

In the last few days we have received a communication from one B. E. Skvirsky who, presumably, is speaking for the "Russian Information Bureau" in Washington, D. C., which, in turn, "is acting as representative of the Joint Information Bureau of Moscow in its endeavors to bring about closer contact between scientists as well as scientific and cultural organizations of the Soviet Union and the other countries." The communication was acknowledged and is now before the Academy.

Attention is also called to the fact that the Geology Section of this Academy held its annual field meeting and excursion in Cleveland and vicinity on May 30, 31 and June 1, 1924, under the leadership of Prof. J. E. Hyde of Western Reserve University. The committee composed of Vice-President Conrey, J. E. Carman and J. E. Hyde, prepared a most attractive program for this annual affair but we have no further report of same.

WILLIAM H. ALEXANDER, *Secretary*.

Report of the Treasurer for the Year 1924-1925.

The following report by the Treasurer was received and referred to the Auditing Committee whose report is appended:

To the Ohio Academy of Science:

The Treasurer submits the following report for the period from April 2, 1924, to March 13, 1925:

RECEIPTS.

Cash balance on hand.....	\$ 554.73
Interest on certificate of deposit.....	39.00
Members dues paid through the A. A. A. S. and directly to the Treasurer.....	600.95

Total Receipts.....\$1,254 68

It is estimated that the library sales of publications will amount to \$37.00, but a statement from Miss McKee is not available at this time.

DISBURSEMENTS.

To E. L. Rice, traveling expenses.....	\$ 11.87
To Hotel Deshler, expenses for Dr. A. P. Mathews.....	12.00
To Wm. H. Alexander, honorarium.....	100 00
To A. E. Kraus.....	59.75
To B. E. Livingston.....	9.00
To B. E. Livingston.....	4 00
To A. E. Kraus.....	15.50
To A. E. Waller, traveling expenses to attend British Association meeting.....	23.05
To Helen Coleman, stenographic assistance.....	7 34
To B. E. Livingston.....	7.00
To Wm. H. Alexander, secretarial expenses.....	23.16
To Delores Dehus, initial fee in A. A. A. S. remitted.....	5.00
To Esther Bearss, initial fee in A. A. A. S. remitted.....	5.00
To Schuler P. Hall, initial fee in A. A. A. S. remitted.....	5.00
To Helen Coleman, stenographic assistance.....	6 00

Total disbursements.....\$193 67

Cash balance on hand March 13, 1925.....\$961.01

CURRENT LIABILITIES (Estimated)

To the Ohio Journal of Science for each member's Journal subscription, approximately 320	\$120.00
To honorarium for the Secretary, 1925.....	100.00
Printing and expenses of the 1925 meeting.....	100.00
Incidentals	40.00
Estimated total	\$360.00
Estimated surplus for current year.....	\$400.00

It is noted that the Academy will hereafter receive but half of the previous year's amount from the American Association. This will represent a loss of nearly one hundred dollars to the annual receipts. Since the Academy will send out its own statements there will be additional printing, postage and clerical assistance necessary.

It has been suggested that the Academy pay for a limited number of plates used in illustrating articles accepted by the editor for the Ohio Journal of Science. It has been expressed before in the Treasurer's reports that the Journal is the best place at our disposal for the expenditure of any small surplus the Academy may accumulate.

Respectfully submitted,

A. E. WALLER, *Treasurer*.

March 31, 1925.

Books, checks, vouchers submitted to the Auditing Committee and found to be correct.

LYNDS JONES,
S. R. WILLIAMS.

Report of the Executive Committee.

The following report of the Executive Committee was received and ordered filed:

WOOSTER, O., April 3, 1925.

To the Ohio Academy of Science:

A meeting of the Executive Committee was called by the President and was held at the Faculty Club Rooms, Ohio State University, Columbus, on December 20, 1924, with three members—Transeau, Waller and Alexander—present. Letters of regret were read from the other two members—Shatzer and Patten. President Transeau presided.

By unanimous vote it was decided to accept the invitation of the College of Wooster to hold the annual meeting for 1925 at Wooster, Ohio, and April 3 and 4 set for the meeting. The appointment of a local committee for the Wooster meeting was left to the President.

It was agreed that the preliminary announcements of the meeting should be issued not later than February 15 and that every effort should be made to obviate the conflict with the Educational Conferences held at the Ohio State University.

It was also agreed that in the event the Secretary was unable to attend the meetings of the A. A. A. S. at Washington, D. C., the latter

part of December, that the Treasurer, Dr. A. E. Waller, should be the representative of the Ohio Academy at a conference of representatives from the several state academies, called by Permanent Secretary Livingston, regarding the matter of affiliation.

It was further voted to recommend to the Academy the appointment of a permanent *Committee on Membership* at the Wooster meeting.

A second meeting of the committee was held last evening at Kenarden Lodge, College of Wooster, Wooster, Ohio, with three members present—Transeau, Waller and Alexander.

At this meeting twenty-seven applications for membership in the Academy were approved subject to final ratification by the Academy.

Respectfully submitted,

WILLIAM H. ALEXANDER, *Secretary,*
For the Committee.

Report of the Publications Committee.

The following report of the Publications Committee was received and ordered filed:

WOOSTER, O., April 3, 1925.

To the Ohio Academy of Science:

The Annual Report of the Thirty-fourth Meeting, Proceedings, Vol. VII, Part 9, contained 39 pages and was published in September, 1924. The report minus the membership list was also published in the *Ohio Journal of Science*: 24: 209-229, 1924.

Respectfully submitted,

H. C. SAMPSON, *Chairman.*

Report of the Library Committee.

The following report of the Library Committee was not received in time to be presented to the Academy but is published for the information of the members:

COLUMBUS, O., April 8, 1925.

MY DEAR MR. ALEXANDER:

I regret very much that pressure of work kept me from submitting to the Ohio Academy of Science the report of the Library Committee in time for reading at the Wooster meeting. I am inclosing the report of Miss McKee of the University Library who has attended to the details of the work this year. I suppose it will be possible for you to include this material in the regular section of the minutes just as if it had been presented at the meeting itself.

MISS MCKEE'S REPORT.

The sale of publications for the year amounted to \$40.36, \$2.62 of which is still outstanding, \$37.74 having been turned over to the Treasurer of the Academy.

Late in December the Proceedings of the Thirty-fourth Annual Meeting were received from the printer and were mailed out in January to the members of the Academy and the exchange list.

Exchange publications received by the Academy have been filed in the Library, some additions having been made to the list this year and one or two that were interrupted by the European war have been revived recently.

Alice D. McKee.

Respectfully submitted,

C. W. REEDER, *Chairman*.

Report of the Trustees of the Research Fund.

The following report of the Trustees of the Research Fund was received and ordered filed:

COLUMBUS, O., April 1, 1925.

To the Ohio Academy of Science:

The accounts of the research fund which came into our hands at the close of the last meeting, proved upon reference to the bank deposits, to amount to the sum of \$1,324.82 as indicated in the Proceedings of the last annual meeting. \$1,300.00 of this amount was put into 7% bonds, leaving a cash balance of \$24.82. The addition of interest in November increased this to \$1,362.91. Accrued interest due May 1st, will bring this amount to \$1,407.41. There have been no bills submitted or paid which is in accordance with the instruction of the Academy, that the funds be conserved during the year and that the trustees recommend a plan of use for the fund in the future.

The question of how to best utilize the research fund, is a somewhat difficult one, but the trustees would suggest the following as a plan which may be subject to modification if the developments of the future indicate a better method.

We recommend that the income from \$1,000.00 of the research fund be available each year for a grant to be known as the McMillin grant and which may be used either for the assistance in some research problem or given as an award in recognition of some especially noteworthy contribution of some member of the Academy. That the balance of the fund and income derived from it, shall be used or allowed to accumulate as the trustees may deem best in any particular year, it being understood that the fund or any interest income shall in all cases be used for the encouragement of research either by grants for individual problems or for the publication of papers resulting from research.

Respectfully submitted,

EDWARD L. RICE,

GEO. D. HUBBARD,

HERBERT OSBORN, *Chairman*.

Report of the Committee on State Parks and Conservation.

The following report of the Committee on State Parks and Conservation was received and ordered filed:

WOOSTER, O., April 1, 1925.

To the Ohio Academy of Science:

It was impracticable to have a meeting of the full committee, but the chairman has requested members of the committee to send him suggestions or remarks concerning the possibilities of work in the committee and has had replies from several members with varied suggestions. It is hoped that the committee may have a meeting in the future and formulate some definite suggestions concerning the management of the State Forest Areas, the Forest Parks and the Game Refuges, which are now under control of state authorities, and we believe that these areas offer a very practical means of preserving the State fauna and flora, and that with the cordial support of the authorities in charge of them, it would be possible to adopt measures which will furnish the most desirable conditions for the use of the parks as well as for the preservation of the native fauna and flora.

The most recent advancement has been the acquisition of a number of tracts for state forests and I cannot do better than quote a statement from Professor Secrest, the State Forester, and a member of this committee, concerning the progress in this line:

"The state department of Forestry was given authority by statute in 1916, to acquire lands for state forest purposes. The price of such land cannot exceed \$10.00 per acre. In 1923 the state forest law was amended, permitting the Department to acquire 'areas of outstanding scenic value, virgin woodlands, and lands containing unusual flora.' In the purchase of such tracts the price is not limited by statute.

"From 1916 to 1921 it was difficult to secure funds for acquiring state forests. Increased appropriations from the Legislature were secured in 1921, and in 1923 were doubled, being \$100,000 for the biennium.

"To date six state forests have been acquired totaling approximately 14,420 acres. These tracts comprise the Dean State Forest of 1,500 acres in Lawrence County; Waterloo State Forest, of 221 acres in Athens County; Scioto County State Forest, 5,200 acres, in Scioto County; Scioto Trail State Forest, of 5,900 acres in Ross County; Pike County State Forest, 1,100 acres in Pike County; and Mt. Logan State Forest of 500 acres in Ross County (under lease from Federal Government.)

"The state forests are located for the most part on 'absolute forest land,' and the tracts are to be devoted not only to experiments and demonstrations in timber culture, but to park and recreation uses as well. The present areas are in some cases nuclei to be further extended in the future. This is particularly true of Dean, Pike, and Scioto Forests. Land can be purchased within the limit of \$10.00 per acre. The topography is rough, the soils thin, and the land largely stocked with second growth hardwood and pine forest. The open area is under 10%, and is in

most cases the typical abandoned fields, which when cultivation ceases are quick to revert to the typical Appalachian Plateau temporary forest types. About 300 acres of these old fields on the State Forests have been planted to a considerable variety of forest trees, which give promise for reforestation purposes. The forestry problems are largely those of protection against fires, and the management of the native forest stands. The State Forests are a delightful place for visitors who are interested in all forms of wild life, and the existing flora and fauna will be preserved and replenished by the protection now afforded these areas.

"The first forest parks were purchased in 1924. Logically enough the start was made in Hocking County where doubtless all will agree by and large Ohio's most outstanding, and interesting scenic areas exist. This is known as the 'cave region.' Not only is the geology most interesting, but the flora is decidedly varied, unique, and interesting. The gorges contain immense specimens of the original virgin woodland—hemlocks, tulip trees, oaks, maples, three species of birch, and a wealth of wild flowers.

"The well known Rock House, The Gulf or Old Man's Cave, and Kunkle's Hollow are now in possession of the State. An option has been secured on Ash Cave, and it can soon be taken over. Other interesting places in this region are contemplated for purchase.

"Other forest parks are under consideration in different parts of Ohio.

"The Parks will be open to the public under rules and regulations free of charge and arrangements will be made to provide accessibility and comfort to a degree that will satisfy those who love the outdoors, and nature's handiwork. The old fields in connection with the Parks, will be planted to trees so that the greatest usefulness will obtain.

"The State Forests and Forest Parks either purchased or under option now number 12, and total approximately 16,500 acres. The number and total area will be increased by July 1st with funds now available."

Professor Fullmer reports that there have been additions to the Cleveland Metropolitan Park System, which now consists of some 4,500 acres, and that "this is being added to from time to time and the opening of roads into some of the tracts has made them more available. It is planned to make a lake of some 100 acres on this portion of the tract near Whips's ledge. This tract lying about 15 miles south of the city in Medina County, has been enlarged by a gift since we visited it two years ago."

Professor Shatzer states that there is opportunity for the development of several miles of River Area Park in the vicinity of Springfield and that it is hoped this tract may be utilized.

The additions to the game refuges which are under the supervision of the Fish and Game Commission have not been reported recently, but while these do not give as permanent a guarantee of preservation as the State forests, they undoubtedly will serve a very valuable purpose, and the refuges which are permanent State property are being so administered that we believe they will prove of much value as biological centers.

The chairman of this committee visited the Royal Palm State Park of Florida last week and was much interested in learning as to its management. It is managed by the State Federation of Women's Clubs under authority of the State and maintains a lodge and provides picnic grounds for tourists, but with scrupulous care to preserve the natural conditions of a very unusual tract of biologic interest.

Respectfully submitted,

HERBERT OSBORN, *Chairman.*

Report of the Committee on Legislation.

WOOSTER, O., April 3, 1925.

To the Ohio Academy of Science:

Unfortunately the members of this committee are rather widely scattered over the State and it has been, therefore, practically impossible to get a quorum present for a formal meeting. A meeting was called for January 10, 1925, but a quorum did not appear. Thereupon the chairman of the committee called together a number of the members of the Academy living in Columbus and vicinity. At this conference were President Transeau, Professors Herbert Osborn, F. H. Kreckler, and C. W. Reeder, and the chairman.

The only matter considered at this informal meeting was whether or not an attempt should be made to get a bill through the 86th General Assembly, and if so, in what form. It was agreed that we should make the effort and the following draft was worked out and submitted to the members of the committee:

H. B. No. 123.

A BILL

RELATIVE TO STATE RECOGNITION OF THE OHIO ACADEMY OF SCIENCE.

Be it enacted by the General Assembly of the State of Ohio:

SECTION 1. The Ohio Academy of Science, a corporation not for profit, incorporated under the laws of Ohio, March 12, 1892, shall be under the control of a board of trustees consisting of fifteen members to serve without salary or per diem. Six of the members of the board shall be appointed by the governor with the advice and consent of the Senate, two to serve for two years, two to serve for four years and two to serve for six years, and until their successors are appointed and qualified, and thereafter two members shall be appointed every two years to serve for a term of six years. The remaining nine members of the board shall be elected by the members of the Academy.

SEC. 2. On and after the taking effect of this act, the Ohio Academy of Science shall constitute an official source of advice and information on all scientific questions within its field submitted to it by any state department or officer thereof. The services of the Academy shall be available to the state or any of its officers in any matter within its field in which the consideration of scientific facts or policies may be involved, and the officers of the state may call upon the Academy of Science, through its properly elected officers or committees appointed by its officers, for such consultation and advice as may be of service to them in their duties. The members of such committees shall receive no compensation for their services, except that all traveling, clerical and other necessary expenses shall be paid. No member of the Ohio Academy of Science, while serving on any such committee shall be eligible for expert service under advice from said committee for which compensation from the state is received.

SEC. 3. The Ohio Academy of Science may issue from time to time publications dealing with the results of scientific investigations. Through such agency or agencies as the board of trustees may designate, said publications shall be made available by distribution, exchange, or sale, to the citizens of Ohio, scientific workers and scientific societies.

SEC. 4. The board of trustees shall submit biennially, to the director of finance, a budget covering the necessary expenses to be incurred in carrying out the provisions of this act, and the general assembly shall make such appropriations as it may deem advisable.

It was further agreed that in as much as Mr. E. J. Riggs of Gallia County introduced a similar bill at our request in the 85th Assembly (H. B. No. 400) he be asked to introduce the bill in the 86th Assembly. This he very kindly consented to do and the bill was introduced as drafted and became known as H. B. No. 123. It was referred to the Finance Committee and after considerable delay the committee gave us a hearing on the Bill. At this hearing appeared on behalf of the Academy, President Transeau, Mr. Arthur Harper, Mr. E. S. Thomas, Dr. R. C. Osburn and the Secretary. The hearing was respectful but fairly perfunctory, as it was clearly evident that the Finance Committee had already closed the door against the Bill. The adverse decision of the committee announced a few days later was not a surprise.

The committee is of the opinion that if the Academy is to continue its efforts along this line—and it so recommends—and hopes to get results, it will be necessary for the Academy to resolve itself into a “committee of the whole” and make a united effort to interest the members of the Assembly through the “folks at home.”

W. H. ALEXANDER *Chairman*,
EDWARD L. RICE,
L. B. WALTON.

Election of Officers and Committeemen.

The following officers and committeemen were duly elected by vote of the Academy upon the recommendation of the Nominating Committee:

President—Paul M. Rea, Cleveland Museum of Natural History, Cleveland.

Vice-Presidents:

Zoology—Clarence H. Kennedy, Ohio State University, Columbus.

Botany—W. Garfield Stover, Ohio State University, Columbus.

Geology—W. H. Shideler, Miami University, Oxford.

Psychology—Harold E. Burt, Ohio State University, Columbus.

Medical Sciences—Dr. Samuel W. Chase, Cleveland.

Physical Sciences—Robert C. Gowdy, University of Cincinnati, Cincinnati.

Secretary—William H. Alexander, U. S. Weather Bureau, Columbus.

Treasurer—A. E. Waller, Ohio State University, Columbus.

Elective Members of Executive Committee—Lewis G. Westgate, Delaware; and M. E. Stickney, Granville.

Publication Committee—Henry C. Beardslee, Perry.

Trustee Research Fund—Geo. D. Hubbard, Oberlin.

Member Library Committee—E. L. Moseley, Bowling Green.

Committee on Legislation—Wm. H. Alexander, Columbus; M. M. Metcalf, Baltimore, Md.; Paul M. Rea, Cleveland; Edw. L. Rice, Delaware; L. B. Walton, Gambier.

Representatives on the Editorial Board of Ohio Journal of Science:

Zoology—R. A. Budington, Oberlin College, Oberlin.

Botany—Bruce Fink, Miami University, Oxford.

Geology—Wilber E. Stout, Ohio State University, Columbus.

Psychology—Erwin A. Esper, Ohio State University, Columbus.

Medical Sciences—F. C. Waite, Western Reserve University, Cleveland.

Physical Sciences—(Vacant).

Election of Members.

The following persons were regularly nominated and elected to membership in the Academy:

BLAYDES, GLENN W.; Botany; 95 Oak Hill Ave., Delaware.

BOGNAR, E. J.; Geology; 1125 S. Seneca, Alliance.

BROWN, WALTER B.; Zoology, Anatomy, Physiology; Granville.

BUSHNELL, JOHN; Botany; Ohio Agr. Exp. Station, Wooster.

CAMPBELL, ROBERT J.; Botany, Entomology; O. S. U., Columbus.

CHASE, JOHN H.; Geology, Biology; 69 Benita Ave., Youngstown.

CHERRY, HELEN; Bacteriology, Geology; R. F. D. 1, Bellwood, Pa.

CLARKE, LEOTA B.; Chemistry; 3103 12th St. N. W., Canton.

COPP, PAUL T.; Mathematics; 233 Hartshorn St., Alliance.

CUTRIGHT, CLIFFORD R.; Zoology, Entomology; Ohio Agr. Exp. Sta., Wooster.

DIKE, CLYDE E.; Botany; Ohio Agr. Exp. Sta., Wooster.

DILLER, JESSE D.; Botany; 1501 Neil Ave., Columbus.

DUNN, PAUL H.; Geology; Miami University, Oxford.

FRYE, WALTER; Geology; 209 Grand Ave., Akron.

GRADY, ROY I.; Physical Sciences; 722 N. Bever St., Wooster.

HAY, LLOYD Q.; Biology, Physiology; North Industry.

HERSH, A. H.; Zoology; Adelbert College, W. R. U., Cleveland.

HOWE, C. E.; Physical Sciences; 189 E. College St., Oberlin.

HOWLETT, FREEMAN S.; Horticulture; Ohio Agr. Exp. Sta.; Wooster.

KUEGLE, PAUL C.; Geology; R. F. D. 4, Loveland Road, Youngstown.

LORD, RICHARD C.; Physical Sciences (Chemistry); Gambier.

MILEY, HUGH H.; Zoology; Miami University; Oxford.

MORGAN, MARY S.; Forestry, Psychology; Astronomy; Girard.

NELSEN, OLIN E.; Microscopic Anatomy, Physiology; 335 Field Avenue, Toledo.

PALMER, MARY C.; Biology, Nature Study; R. F. D. 2, 760 Midlothian Road, Youngstown.

POOS, F. W.; Entomology; Box 283; Sandusky.

PRICE, JOHN W.; Zoology; Pataskala.

- ROTH, CONRAD; Birds, Wild Flowers, Forestry; 1715 Robinson Ave., Portsmouth.
- ROWLES, EMMETT; Zoology, Medical Sciences; 97 Franklin Ave., Athens.
- SCOTT, JOSEPH M.; Bacteriology, Animal Parasitology; 141 Simpson St., Alliance.
- SCOTT, LUTHER C.; Geology; Toledo University, Toledo.
- SPENCER, WARREN P.; Zoology; 138 N. Walnut; Wooster.
- STEELE, MIDA L.; Botany; R. F. D., 1, Creston.
- STEWART, GRACE A.; Geology; O. S. U., Columbus.
- STINCHCOMB, G. A.; Physical Sciences; 138 Greenfield St., Tiffin.
- SWENSON, ENGELBREKT A.; Physiology, Anatomy; W. R. U., Cleveland.
- TAYLOR, L. W.; Physical Sciences; 30 N. Pleasant St.; Oberlin.
- TERWILLIGER, CHAS. VAN ORDEN; Physical Sciences; O. S. U., Columbus.
- THIESSEN, NORMA W.; Chemistry, Biology; 1491 Lakeland Ave., Lakewood.
- THOMPSON, OSCAR E.; Zoology, Botany; 42 Rice St., Alliance.
- TRIESCHMANN, JACOB E.; Physical Sciences (Chemistry); 28 W. Davis St., Tiffin.
- WATSON, S. A.; Biology; Wilmington College, Wilmington.
- WESTHAFFER, W. R.; —————; College of Wooster, Wooster.
- WIEBE, ABRAHAM H.; Biology; Bluffton.
- WILCOX, R. B.; Botany; Wooster.
- WILLIAMS, C. G.; Physical Sciences; Ohio Agr. Exp. Station, Wooster.

Report of the Committee on the Election of Fellows.

WOOSTER, O., April 3, 1925.

To the Ohio Academy of Science:

A meeting of the Committee on the Election of Fellows was held last evening at Kenarden Lodge, College of Wooster, Wooster, Ohio. Six members of the committee were present and the other members were represented by proxy.

Of the candidates considered, two received the necessary nine favorable votes and were declared elected. The fellows elected will be personally notified, and the list will be published in the Proceedings of this meeting.

Respectfully submitted,

WILLIAM H. ALEXANDER, *Secretary,*
For the Committee.

The following is a list of those elected Fellows:

HENRY CURTIS BEARDSLEE
JOSEPH H. TODD

The following Special Report on the Relations between the American Association for the Advancement of Science and The Ohio Academy of Science was received and ordered filed:

WOOSTER, O., April 2, 1925.

To the Ohio Academy of Science:

The plans for affiliation between the American Association and the various state academies were made the subject of action at the St. Louis meeting of the Association in 1919. In January of 1920 your Treasurer was asked to inquire of Doctor L. O. Howard the results of this action and received the following reply:

"Yours of the 6th has come. I find that your understanding of the affiliation matter is correct and corresponds with the action of the Council at St. Louis, with the exception of No. 1. Following is a transcript from the minutes of the Council meeting of December 29th:

"The Committee on Affiliation of State and Local Academies reported the following recommendations:

- "1. That State academies be affiliated on a financial basis that will yield the Association four dollars net per member.
- "2. Any State academy which concludes arrangements for affiliation within the first six months of 1920 may be accepted for the entire year 1920, fees paid to the Association before that date to be adjusted in accordance with the detailed plan.
- "3. Two alternative plans are considered with respect to membership in the academies, namely (a) All members of the academy to affiliate with the Association; (b) To establish two grades of membership, of which one will be national, involving membership in both academy and Association; the other local, consisting of academy membership only.
- "4. The academies will collect joint dues and transmit the Association's share to the Treasurer.

"Voted that the report of the Committee on Affiliation of State and Local Academies be received and approved.

"Your No. 4 is all right. The collection of four dollars instead of three by the Association is necessitated by the new arrangement by which the Association pays the journal *Science* three dollars for each new member. You see we must have something for overhead expense."

It is clear from this letter that our Academy was not altering its dues, but that the Association was to receive one dollar less for the subscription to "Science" from all of its affiliated State Academy members. That this is plainly understood as the basis of the financial arrangement is still further brought out in a letter dated May 21 from Dr. B. E. Livingston, who succeeded Dr. Howard as Permanent Secretary of the Association:

"Replying to your several letters, your ideas about the nature of the affiliation between the Ohio Academy of Science and the American Association for the Advancement of Science are quite right. I think I have everything clear now.

We refund \$1 for each member of the Academy who has paid \$5 dues to the American Association for 1920. For each new member you are to send this office \$4, together with his name and address and a statement of which journal he prefers. The journal will be ordered as soon as the remittance and data are at hand. Since back issues of the journals are limited, prompt action is necessary. Also, of course a new member would like to have his journal begin promptly. I suggest that you send me new members' names and remittance for them so that they will reach here on Wednesday of each week. We send our list to *Science* every Friday.

"I want to ask you if you can follow this scheme for collecting dues next October. We will have a special statement card prepared for Academies. On its front will be a statement of the affiliation and blank spaces for imprinting the Academy name and the bill for 1921 dues. On the back will be blanks to be filled in by members, for information for this office and for Membership List, A. A. A. S. We will put the name and address of member on front of card and send all cards to you. We will also supply window envelopes for you to mail cards out in. You are to send these out about September 25 or so and they are to come back to you, with members' remittances. You are to send the cards to this office with \$4 for each one. This scheme will get your members on cards here which are just like the cards of our other members. I hope you will fall into this idea, for it is essential that we have the same system for all our members. A new membership list is being prepared and it is necessary that we have all the information about all members promptly after October 1."

It was not only clear from this that the Association was expecting to reduce the joint dues of members of both organizations, but also they were going to help in obtaining an increasing membership in the Academies.

After a year of this, however, the cost to the Association of remitting one dollar to each of its members who was also a member of a state Academy was greater than at first anticipated. In the correspondence of that period with Dr. Livingston, this amount lost to the Association by its voluntary relinquishment of one dollar of the price of the subscription to "*Science*" came to be regarded as money needlessly turned back to the individuals from whom it had been collected. From the point of view of State Academies which do not publish Journals or Proceedings of a scientific nature and whose membership fee had always been lower than ours in the Ohio Academy it was a clear gain of a dollar per member. Dr. Livingston wishing to call attention to what was undoubtedly great financial assistance to these Academies gave a name to the remitted funds and called them "*Grants of the Association to the Academies.*" It must be remembered however that in our Academy we had not changed our dues or our Journal costs. To us it was simply the arrangement originally proposed in the St. Louis meeting of the Association, namely—a reduction in the cost of *Science*. We did not see any reason for charging more for the *Ohio Journal of Science* for the members of the Association than for the Academy members who were not also Association members, and we simply returned the money to the former. Personally speaking I did not think that a mistake at the beginning of our affiliation and I do not think it a mistake now.

Correspondence was often voluminous over the manner of payments of the members and the affiliation arrangement for the past five years has been purely a financial arrangement from which no scientific benefits have accrued. As there were new plans evolved they would often come as "instructions" from the Association office. There was no way of obtaining a list from the Association of its members who were desirable from the standpoint of their attainments and residence in the State as prospective members of the Academy. We furnished the Association each year with the lists of our members. In 1923 the increases in enrollment in the Association through direct recommendation of the Treasurer were counted as seventeen. No account was taken at that time of the

total increases in Ohio. This was putting the increases in membership in an unfair light as undoubtedly the Academy members many of whom are science teachers and research students were largely responsible for these new memberships in the Association.

The Association after two years of having dues collected by the Treasurer in each of the affiliated Academies decided to collect its own dues. This seemed to your Treasurer psychologically unsound, as it meant that two bills in place of one must be collected from each member. The following paragraph is taken from a letter to Dr. Livingston written by the Treasurer under date of March 8, 1923:

"Your letter of February 23d which should have been sent to me was forwarded by Dr. Rice and reached me yesterday. You are doing the Ohio Academy of Science a great injustice in supposing that only seventeen new members were received through the Academy for the A. A. A. S. Our lists are not worth checking over on this point, but I know more than seventeen members have been added. You are doing the Academy a serious injury in changing the billing of the A. A. A. S. members from the office here to the Washington office because the members have just been trained to send the money here. Now your order (for that strong word is just about what it amounts to) comes, to abandon this system and substitute the collection directly through your office. Certainly the Academy can not be supposed to have been glad to collect the money for you in the first place. They did it simply as an accommodation and in the matter of the affiliation it seemed as though it would be an easy way of completing the arrangement."

With all of this there was still nothing but a financial arrangement and there was no scientific advance. There was further an annoying distinction made between the affiliated academies and the affiliated Societies which was also on a financial basis, namely that a five dollar initial fee was remitted if the new member was also a member of an affiliated Society. It was in consequence difficult to find out exactly what a new member should pay.

Passing over the correspondence of the next year, we wish to note the work of Professor Osborn in attempting to raise the level of the basis of affiliation from an exchange of checks to the point where scientific work might be benefited. A paragraph from a letter of Dr. Transeau to Dr. Livingston under date of December 8, 1924, will serve:

"In view of the difficulties attending the collection and distribution of the dues, and the apparent change in point of view of the American Association indicated by a comparison of your letter with that of Dr. Howard, I would suggest that the proposal made by Professor Herbert Osborn might meet the situation. As I understand his scheme, it is that the dues be collected as before the affiliation, and that the Association actually subsidize the academies according to their membership, \$25 for those having one hundred members or less, \$50 for those having between one and two hundred members, and \$100 for those having 300 or more members. These amounts would be credited to the Academy as a whole and would not be rebated to members. In this way the affiliation would not be weakened and the Association would not be called upon for any large contribution to the Academies."

This letter was written shortly before the Washington meeting of the Association. Through the Association's committee on State Academies and the letters from the affiliated academies registering protests to the secretary there was at the last meeting an attempt to come to an understanding and to bring our affiliation to a reasonable arrangement,

namely, to cost the Association less, but to derive more of scientific benefits from the work of the scientific men of the country. The Association has spent more money than it feels it should by reducing the price of *Science* to Academy members and is proposing a new and less expensive arrangement. It is contained in the following paragraphs:

(10) The Council adopted the following resolutions concerning the future of arrangements with affiliated academies of science and local branches:

(a) In view of the rapid increase in the number of members concerned, it has become impossible to continue the annual grants to affiliated academies and local branches as in the past, and the association consequently finds it necessary to reduce the allowances for these organizations, for 1926 and until further notice, to one-half of the present amount per member. This reduction is to go into effect October 1, 1925.

(b) All members of any affiliated academy are to be at all times, until further notice, eligible to admission to the association on certification by the proper academy officer and without payment of the usual entrance fee.

(c) The permanent secretary is instructed to take up the applications for academy affiliations according to the modified arrangements for academy affiliation now authorized.

5. Since the academy allowance from the Association is now to be but 50 cents per year per member, it seems desirable that the affiliated academies should collect full academy dues from their association members. It is hoped that those academies that have heretofore credited association allowances as academy dues will arrange this matter this spring, so that there may be no misunderstanding on the part of their members next fall when the new rule is to go into effect. It may be desirable for the proper academy officer to send to all association members of his academy an announcement on this subject, either before or at the time of sending out the bills for annual dues. The facilities of the permanent secretary's office are offered to the affiliated academies in this and similar kinds of circularization: multigraphing, mimeographing or printing circulars or letters and the addressing of envelopes for academy work can be cared for at the Washington office at actual cost or less, if the academy so desires. The general facilities of the office are to be at the service of the affiliated academies, with probably some saving in cost.

Since the arrangement between the American Association and the Academy has been largely a financial one, your Treasurer has cared for most of the correspondence. The Association promises for the future that the affiliation will have less of a financial and more of a scientific conscience. The association therefore asks the appointment of a representative from each of the State Academies. This is expressed in the recent communication under date of March 21, 1925, as follows:

REPRESENTATION OF AFFILIATED ACADEMIES IN THE ASSOCIATION.

D. Each affiliated academy is to have, as heretofore, a representative in the council of the Association, thus taking part in the direction of association affairs.

It is hoped that the academy representatives will be named as early in the year as possible, so as to be listed in the permanent secretary's files. If an academy representative is to be unable to attend an annual meeting of the Association another may at any time be named to take his place. In general, an academy representative will be considered as remaining in office until his successor is officially named to the permanent secretary's office.

It is suggested to the Ohio Academy that this representative be appointed as heretofore by the executive committee.

It cannot be denied that the Association has maintained a vacillating policy toward the State Academies. That this probably will continue is to be seen in the following paragraphs from the communications of March 21 from Dr. Livingston (*italics inserted by the Treasurer*).

G. *Term of these arrangements.*

"It is understood that those arrangements of academy affiliation are not to be considered as in any way binding on the Association beyond the actual statements here made. The arrangements here described are to go into effect October 1, 1925, *and are to be continued until further action by the council of the Association.* Modifications may be made from year to year and the nature of such modifications will doubtless be determined by the degree of success with which the purposes of the affiliation are fulfilled. It is understood, however, that no changes in the financial or membership aspect of these arrangements will be placed in operation without at least a six-months' preliminary notice to the academies. An academy may withdraw from the affiliation on six months' notice.

"*It is to be hoped that the affiliated academies will continue to increase in strength and that the time may soon come when they will not need to accept financial grants from the Association.* It is to be remembered that the source of academy allowances is solely the association membership dues paid by members and that there are before the Association many projects for advancing American science that will require funds from this source. If any affiliated academy may find it possible to remit its annual association grant such action will be greatly appreciated by the latter, the funds thus freed will be utilized to advance science in other ways, and the non-financial aspects of the affiliation may be strengthened by such remission of grants.

"The officers and representatives of the affiliated academies are invited to make further suggestions for improving the association-academy relations, and to inform the permanent secretary as to their approval or disapproval of the paragraphs of this memorandum, or as to their suggestions regarding the improvement."

A. E. WALLER, *Treasurer.*

April 2, 1925.

Following the reading of the above report, there was considerable discussion, pro et con, relative to the advisability of continuing the affiliation between the Ohio Academy of Science and the A. A. A. S. Finally, upon motion of L. B. Walton, seconded by R. V. Bangham, the matter was referred to the Executive Committee with power.

Report of the Committee on Resolutions.

The following resolutions were submitted by the Committee and unanimously adopted by the Academy:

1. The Ohio Academy of Science wishes to express its appreciation to *The College of Wooster*, The Ohio Agricultural Experiment Station and the unusually efficient local Committee, for making this, the Thirty-fifth Annual Meeting one of the most successful as well as enjoyable the Academy has held.

2. The Academy furthermore desires to extend to the representatives of the Press its cordial appreciation of the space given in the papers to the program and to the results accomplished by the members of this Academy.

3. The Ohio Academy of Science in session at Wooster, Ohio, wishes to place itself on record as deploring the recent action of the Governor and the Legislature of the State of Tennessee in connection with their recent enactments relative to natural phenomena. The publicity thus developed will prove disadvantageous to the best interests of the State.

4. The Ohio Academy of Science assembled at Wooster, Ohio, wishes to express its sympathy to the teachers of science in Tennessee in connection with the handicaps under which they have been placed in teaching the truths of nature.

L. B. WALTON,
J. H. SCHAFFNER,
CARL VER STEEG,
Committee.

Report of the Committee on Necrology.

The Committee on Necrology records the loss by death during the year of four members, *viz.*:

Charles W. Napper, Greenfield;
Prof. A. D. Selby, Ohio Agricultural College, Wooster;
Prof. Septimus Sisson, Ohio State University, Columbus;
Prof. Herrick E. Wilson, Oberlin College, Oberlin.

Scientific Sessions.

The following is the complete scientific program of the meeting:

PRESIDENTIAL ADDRESS.

Accumulation of energy by plants.....EDGAR N. TRANSEAU

PUBLIC LECTURE

The work of the Ohio Agricultural Experiment Station.....C. G. WILLIAMS

PAPERS

1. Orchard Spraying and Human Health. (10 min.).....J. S. HOUSER
2. Local Lists of Plants and Animals. (20 min.).....LYNDS JONES
3. Modern Ideas of Soil Development. (20 min.).....G. W. CONREY
4. Entomological Conditions in Cuba. (20 min.).....HERBERT OSBORN
5. A Biological Basis of Learning. (20 min.).....H. M. JOHNSON

6. Daily Life of the American Eagle; Early Phase (30 min.) (lantern).....
FRANCIS H. HERRICK
7. Relation of Temperature and Rainfall to Hessian Fly Development.
(15 min.) (lantern).....H. A. GOSSARD
8. Seiches in Lake Erie and Their Ecological Significance. (20 min.)
(lantern).....FREDERICK H. KRECKER
9. Repeated Rejuvenations in Hemp. (12 min.).....JOHN H. SCHAFFNER
10. The Dynamic Factor in Heredity. (12 min.).....A. B. FLOWMAN
11. Monocular and Binocular Vision. (15 min.).....PRENTICE REEVES
12. A Theory of Nerve Conduction and Its Application to Imagination and
Habit. (15 min.).....N. M. JOHNSON
13. Intra-relationships of Echinoderms as Evidenced by Ciliation. (10 min.)
(lantern).....R. A. BUDINGTON
14. The Relation of the Respiratory Exchange to Differentiation and Dedif-
ferentiation in *Obelia* Sp. (10 min.).....EMMETT ROWLES
15. The Sexual Structures of *Polydesmus Serratus*. (10 min.).....STEPHEN R. WILLIAMS
16. The Development of the Male Gonopods in *Euryurus Erythropygus*,
Brandt; a Polydesmid Millipede. (10 min.).....HUGH H. MILEY
17. On the Structure of a Trematode of the Genus *Eumegaceste* Found in the
Cloaca of the Common Tern at Put-in-Bay in 1924. (10 min.).....
JOSEPH N. MILLER
- (Introduced by Prof. F. H. Kreckner)
18. The Correlation of the Seasonal History of the European Corn Borer with
Seasonal Planting of Corn. (5 min.) (lantern).....L. L. HUBER
19. Aphids New to Ohio. (By title).....C. C. CUTRIGHT
20. Some Reactions of *Pemphigus* Sp. (5 min.) (lantern).....C. C. CUTRIGHT
21. Exact Determination of Food Requirements in Bringing Insects to
Maturity. (10 min.).....E. R. BRYANT
22. On the Anatomy of the Head and Thorax in *Ranatra* (Heteroptera). (10 min.)
(lantern).....C. R. NEISWANDER
23. The Evolution of Insects Based on a Study of the Appendages. (10 min.)
L. B. WALTON
24. A Biological Record and Classification Card. (5 min.).....L. B. WALTON
25. The Calorigenic Effect of Adrenalin. (15 min.).....M. W. CASKEY
26. Some Observations on the Architecture of the Spongiosa of the Calcareus.
(15 min.) (lantern) (See demonstration No. 1).....SAMUEL W. CHASE
27. Rickets and Osteoporosis in Swine as Affected by Nutrition. Dietary
Factors. (15 min.) (lantern).....G. BOHSTEDT
28. Rickets and Osteoporosis in Swine as Affected by Nutrition. Pathology.
(15 min.) (lantern).....B. H. EDGINGTON
29. The Effect of Light on Calcification of Bone. (15 min.) (lantern).....
R. M. BETHKE
30. Some Preliminary Notes on the Plankton of the Kartabo Region, British
Guiana. (10 min.) (lantern).....HUGH M. RAUP
31. Some Factors Which Determine the Size of the Eye of *Drosophila*.
(15 min.).....A. H. HERSH
32. A Note on Wing Venation in Certain Diptera. (5 min.) (lantern).....JAMES S. HINE
33. Experiences and Experiments in Teaching Embryology. (10 min.).....
BRADLEY M. PATTEN
34. The Fauna of a Limestone Spring in Cliff Park, Springfield, Ohio. (10 min.)
(lantern).....HUGH M. RAUP
35. The Relative Values of Morphological Adaptations. (10 min.).....
CLARENCE H. KENNEDY
36. Relation of Temperature to the Physiology of the Potato Plant. (15 min.)
JOHN BUSHNELL
37. Some Abnormalities in Mniun. (10 min.).....CHAS. H. OTIS
38. Certain Aspects of the Chemical Composition of the Apple Flower. (12
min.).....FREEMAN S. HOWLETT
39. Lodging in Oats and Wheat. (15 min.).....F. A. WELTON
40. Variations in American Crab Apple (*Malus Glaucescens*, Rehder).
(5 min.).....E. L. FULLMER

41. Some Factors Influencing the Development of *Venturia Inaequalis*. (10 min.).....H. C. YOUNG
42. Degeneration of Potatoes in Ohio. (15 min.) (lantern).....PAUL E. TILFORD
43. Effects of Lightning on the Trunk of *Platanus Occidentalis*. (5 min.)....JOHN H. SCHAFFNER
44. The Microchemistry of Flax Fiber Formation. (10 min.) (lantern).....DONALD B. ANDERSON
45. Some Fresh Water Algae from Fukien, China. (5 min.).....L. H. TIFFANY
46. Pre-Staining in Histological Technique. (10 min.).....CHAS. H. OTIS
47. The Seasonal Development of Apple Scab in Central Ohio in 1924. (10 min.) (lantern).....H. W. JOHNSON
48. The Genus *Oedogonium*. (15 min.).....L. H. TIFFANY
49. Experiments on the Control of Apple Scab in Central Ohio in 1924. (10 min. (lantern).....W. G. STOVER and H. W. JOHNSON
50. Some Mississippian Physiography of Northeastern Ohio. (25 min.).....G. F. LAMB
51. Peneplains and Straths in Southern Ohio. (15 min.).....WILBUR STOUT
52. Peneplains in Muskingum County, Ohio. (10 min.).....G. W. CONREY
53. The Uplands of Jefferson County, Ohio. (5 min.).....R. E. LAMBORN
54. A Method of Estimating Post-Glacial Time. (10 min.) (lantern).....ALLYN C. SWINNERTON
55. Geologic Structures in Southern Vermont. (15 min.).....GEO. D. HUBBARD
56. Limestone Caves in Ohio (10 min.).....GEO. W. WHITE
57. The Areas of Distribution of Paleozoic Seas in the Arctic Regions of North America, Europe and Asia, in Connection with the Problem of Circumpolar Seas. (15 min.).....AUG. F. FOERSTE
58. Difference in Niagaran Faunas Due to Development in Distinct Arms of the Sea, in Connection with the Cincinnati, Kankakee, LaSalle and Other Anticlines. (15 min.).....AUG. F. FOERSTE
59. A Drag Fault. (8 min.).....G. F. LAMB
60. Some Recent Deep Wells in Ohio. (15 min.).....J. A. DOWLING
61. Dip and Expansion of Deep-seated Rocks in Eastern Ohio. (10 min.)....WILBUR STOUT
62. The Members of the Monroe and their Distribution in Ohio. (15 min.)...J. ERNEST CAEMAN
63. Some Striking Features of the Lower Mercer Limestone in Mahoning County (8 min.) (Introduced by Prof. G. F. Lamb)....EDWIN J. BOGNAR
64. A Suggestion in Teaching Economic Geology. (5 min.).....GEO. D. HUBBARD
65. The Scrub Grass Coal in Ohio. (10 min.).....WILBUR STOUT
66. The Laws of Motion Under Constant Power (10 min.) (lantern) L. W. TAYLOR
67. A Precision Determination of the Acceleration of Gravity. (10 min.) (lantern).....H. HUGH WILLIS
68. A Quantitative Measurement of the Change in Intensity in Radio Signals During the Transition from Daylight to Dark. (15 min.) (lantern)...C. E. HOWE

DEMONSTRATIONS

1. Specimens to Illustrate Paper No. 26SAMUEL W. CHASE
2. Grey Squirrel Killed by Excessive Growth of Incisor Teeth.....E. W. SCHEAR
3. Drawings of Forster's Types of Odonata.....CLARENCE H. KENNEDY
4. Iron Bacteria from Yellow Springs, Ohio..A. C. SWINNERTON and O. L. INMAN
5. The Mateer Embryo. Presomite Human Embryo-Twin. (Slides and Models).....H. N. MATEER
6. One Cause of the Failure of Canada Thistles to Produce Seeds..FREDA DETMERS
7. Progress of the Common Barberry Eradication Campaign, 1918-1924....JOHN W. BARINGER
8. Slides Showing Musculature of Appendages in Hexapoda.....L. B. WALTON
9. Biological Record Cards.....L. B. WALTON

THE OHIO ACADEMY OF SCIENCE

CONSTITUTION

Adopted November 28, 1908.

Reprinted, with Amendments, 1925

ARTICLE I—NAME.

This Society shall be known as the Ohio Academy of Science.

ARTICLE II—OBJECTS.

The objects of this Academy shall be the promotion of scientific research and the diffusion of knowledge concerning the various departments of science.

ARTICLE III—MEMBERSHIP.

1. *Classes of Members.* The Academy shall be composed of resident members, corresponding members, fellows, honorary members, and patrons.

2. *Resident Members.* Resident members shall be persons interested in scientific work and resident in the State of Ohio.

3. *Corresponding Members.* Corresponding members shall be persons interested in science and not resident in the State of Ohio.

4. *Fellows.* Fellows shall be persons who are engaged in productive scientific work.

5. *Honorary Members.* Honorary members shall be persons distinguished for their attainments in science and not resident of the State of Ohio. Their number shall not exceed twenty-five.

6. *Patrons.* Patrons shall be persons who have bestowed important favors upon the Academy as defined in the By-Laws.

7. *Privileges of Members.* Only resident members, fellows, and patrons shall be entitled to vote in the Academy; only fellows and patrons shall be eligible to office and to membership in the Executive Committee.

ARTICLE IV—OFFICERS, COMMITTEES, ETC.

1. *Officers.* The officers of the Academy shall be a President, a Vice-President of each section organized, a Secretary, and a Treasurer.

2. *Executive Committee.* The President, Secretary, and Treasurer, together with two elective members, shall constitute an Executive Committee.

3. *Publication Committee.* The Publication Committee shall consist of three elective members.

4. *Program Committee.* The Program Committee shall consist of the Secretary and the Vice-Presidents of the various Sections.

5. *Trustees of Research Fund.* Three trustees elected in accordance with Section 16 shall be designated as Trustees of the Research Fund.

6. *Library Committee.* The Library Committee shall consist of three members elected in accordance with the provisions of Section 16.

7. *Committee on State Parks and Conservation.* The Committee on State Parks and Conservation shall consist of nine members elected in accordance with the provisions of Section 18.

8. *President.* The President shall discharge the usual duties of a presiding officer at all meetings of the Academy and of the Executive Committee. He shall take cognizance of the acts of the Academy and of its officers, and cause the provisions of the Constitution and By-Laws to be faithfully carried into effect. He shall also give an address to the Academy at the annual meeting of the year for which he is elected.

9. *Absence of President.* The duties of the President in case of his absence or disability shall be assumed by one of the Vice-Presidents designated by the Executive Committee.

10. *Vice-Presidents.* The Vice-Presidents shall be chairmen of their respective Sections. They shall further, with the Secretary acting as chairman, constitute a Program Committee to arrange for the presentation of papers at the annual meeting.

11. *Secretary.* The Secretary shall keep the records of the proceedings of the Academy and a complete list of the members with the dates of their election and disconnection with the Academy. He shall co-operate with the President in attending to the ordinary affairs of the Society and also attend to the preparation, printing and mailing of circulars, blanks and notifications of elections and meetings. The Secretary shall superintend printing ordered by the Executive Committee, which is not within the province of the Publication Committee.

and shall have charge of its distribution under direction of the Executive Committee. The Secretary shall also be chairman of the Program Committee as constituted in Section 4.

12. *Treasurer.* The Treasurer shall have the custody of all funds of the Academy. He shall keep an account of receipts and disbursements in detail, and this account shall be audited as hereinafter provided.

13. *Duties of Executive Committee.* The Executive Committee is clothed with executive authority and with legislative powers of the Academy in the intervals between the regular annual meetings. No extraordinary act of the committee shall, however, remain in force beyond the next annual meeting unless ratified by the Academy. The Executive Committee shall receive nominations for membership and on approval shall submit such nominations to the Academy for action. It shall have the power to fill vacancies *ad interim* in any of the offices of the Academy.

14. *Duties of Publication Committee.* The Publication Committee shall have charge of the preparation and publication of the Annual Report and of such other papers as may be considered by them desirable to have printed.

15. *Duties of Trustees of Research Fund.* The Trustees of the Research Fund shall be three in number. They shall have charge of the allotment and distribution of the income or of the principal of the Research Fund.

16. *Duties of Library Committee.* The Library Committee shall advise with the Librarians of The Ohio State University on all questions arising in connection with the management of the Library of the Ohio Academy of Science, deposited with the Ohio State University Library, and in connection with the distribution of the publications of the Academy.

17. *Duties of Committee on State Parks and Conservation.* The Committee on State Parks and Conservation shall consider the various possibilities in the formation of State Parks in areas of scenic, geological, or biologic interest, and other effective methods for the preservation of the native fauna and flora and for the conservation of the natural resources of the State; it shall co-operate in all possible ways with other societies, institutions, and State officers in the promotion of these objects.

18. *Terms of Office.* The President, Vice-Presidents, Secretary, Treasurer, and elective members of the Executive Committee and Publication Committee shall be elected annually at the annual meeting,

and shall be eligible to re-election without limitation, with the exception of the President, who shall not be elected for successive terms. The Trustees of the Research Fund, the members of the Library Committee, and the members of the Committee on State Parks and Conservation shall be elected for a term of three years, one Trustee, one member of the Library Committee, and three members of the Committee on State Parks and Conservation being elected each year.

ARTICLE V—VOTING AND ELECTIONS.

1. *Nomination of Members.* (a) Nominations for resident membership shall be made by two resident members in accordance with a form provided by the Executive Committee. One of such resident members must be acquainted with the nominee and his qualifications for membership. The nominations shall be considered by the Executive Committee and if approved by each of its members, shall be submitted to a vote of the Academy at any annual or special meeting.

(b) Nominations for corresponding members, honorary members, and patrons, shall be made by the Executive Committee of the Academy, the elections to take place as in the case of resident members.

2. *Election of Members, etc.* All elections shall be by ballot. To elect a Resident Member, Corresponding Member, Honorary Member, or Patron, shall require the assent of three-fourths of all Resident Members voting.

3. *Election of Fellows.* Fellows shall be elected by joint action of the Executive Committee and the Vice-Presidents, from nomination endorsed by two fellows of the Academy. Such nominations shall be accompanied by documentary evidence of the candidate's scientific achievements upon which the nomination is based. Approval by three-fourths of this joint committee shall be necessary to election.

4. *Expulsion.* Any member may be expelled by a vote of nine-tenths of all members present at any annual meeting, provided notice that such a movement is contemplated be given to members at least three months previous to such action.

5. *Election of Officers.* Nominations for office shall be made by a nominating committee as provided in the By-Laws. The nominations shall be submitted to a vote of the Academy at its regular annual meeting. The officers thus elected shall enter upon their duties at the adjournment of the meeting.

ARTICLE VI—MEETINGS.

1. The date and place of the Annual Meeting shall be fixed by the Executive Committee, subject to such instructions as shall be determined by the Academy at the preceding Annual Meeting, and shall be announced by circular at least thirty days before the meeting. The details of the daily session of each meeting shall be arranged by the Program Committee and announced in the official program immediately before the meeting.

2. *Field Meeting.* A field meeting may be called at the option of the Executive Committee.

3. *Special Meeting.* A special meeting of the Academy may be called by the Executive Committee upon the written request of twenty resident members.

4. *Quorum.* Fifteen resident members shall constitute a quorum for the transaction of business.

ARTICLE VII—SECTIONS.

1. *Formation of Sections.* Members not less than fifteen in number may by special permission of the Academy unite to form a section for the investigation of any branch of science. Each section shall bear the name of the science which it represents, thus: The Section of Geology of The Ohio Academy of Science.

2. *Privileges of Sections.* Each section is empowered to perfect its own organization as limited by the Constitution and By-Laws of the Academy.

ARTICLE VIII—AMENDMENTS.

1. This Constitution may be amended at any annual meeting by a three-fourths vote of all resident members voting, provided that the substance of the amendment shall have been submitted at a preceding Annual Meeting.

BY-LAWS

CHAPTER I—MEMBERSHIP.

1. *Dues.* No person shall be accepted as a resident member or as a corresponding member unless dues for the year are paid within three months after notification of election. The annual dues shall be two dollars, payable in advance. A single payment of twenty-five dollars, however, shall be accepted as commutation for life.

2. *Investment of Commuted Dues.* The sums paid in commutation of dues shall be invested, and the interest used for the ordinary purposes of the Academy during the payer's life, but after his death the sum shall be converted into the Research Fund.

3. *Non-payment of Dues.* Non-payment of annual dues shall deprive a resident member of taking part in the management and receiving the publication of the Academy. An arrearage continuing over two years shall be construed as notification of withdrawal. The Secretary and Treasurer shall be exempt from the payment of dues during the year in which they hold office.

4. *Patrons.* Any person eligible under Article III of the Constitution may be elected a Patron of the Academy upon payment of one hundred dollars to the Research Fund of the Society.

CHAPTER II—OFFICIALS.

1. *Authorization of Accounts.* The President and the Treasurer shall countersign, if they approve, all duly authorized accounts and orders drawn for the disbursement of money.

2. *Duties of Treasurer.* The Treasurer shall give bonds with two good sureties approved by the Executive Committee in the sum of five hundred dollars, for the performance of his duties and the safe keeping of the funds of the Academy. He may at his discretion deposit the funds in a bank, but shall not invest them without the authority of the Executive Committee. His accounts shall be balanced on the first day of the Annual Meeting of each year.

3. *Honorarium of Secretary.* The Secretary shall receive an annual honorarium of one hundred dollars, from which he shall pay for any clerical help employed.

CHAPTER III—ELECTION OF MEMBERS.

1. *Nomination of Resident Members.* Nominations for resident members may be proposed at any time on blanks to be supplied by the Secretary.

2. *Form of Nomination.* The form for the nomination shall be as follows:

Ohio Academy of Science.

To the Committee on Membership:

I desire to become a member of the Ohio Academy of Science.

Name _____

Address _____

Branches of Science in which Interested _____

Countersigned by Members: _____

3. *Election of Resident Members.* This form when filled is to be transmitted to the Secretary who shall bring all nominations before the Executive Committee at either the annual, special, or field meetings of the Academy; and the Executive Committee shall signify its approval or disapproval of each. The list of candidates approved shall then be presented to the Academy for election.

4. *Patrons, etc.* Patrons, honorary members, and corresponding members shall be nominated by the Executive Committee and shall be elected in the same manner as resident members.

5. *Nomination of Fellows.* A suitable blank for nomination of fellows shall be supplied by the Secretary and shall be mailed to each member of the Academy at least once each year.

CHAPTER IV—ELECTION OF OFFICERS.

1. *Election of Officers.* At the Annual Meeting the election of officers shall take place and the officers elected shall enter on their duties at the end of the meeting.

2. *Nominations.* The Academy shall elect by ballot a Nominating Committee, consisting of one representative from each regularly organized Section of the Academy, who shall nominate a candidate for each

office, including elective members of the Executive Committee, the Publication Committee, the Trustees of the Research Fund, the Library Committee, and the Committee on State Parks and Conservation. Additional nominations may be made by any member of the Academy.

CHAPTER V—FINANCIAL METHODS.

1. *Authorization of Expenditures.* No pecuniary obligation shall be contracted without express sanction of the Academy or the Executive Committee. It is understood, however, that all ordinary expenses in connection with the meetings have the permanent sanction of the Academy without special action.

2. *Bills and Vouchers.* Every creditor of the Academy must present to the Treasurer an *itemized* bill certified by the official ordering it, and approved by the President. The Treasurer may then approve and pay the amount out of any funds not otherwise appropriated, and the receipted bill shall be held as his voucher.

3. *Audit.* At each annual meeting the President shall call upon the Academy to choose two members who are not officers of the Society, to whom shall be referred the books of the Treasurer duly posted and balanced to the first day of the Annual Meeting as specified in Chap. II, Sec. 2, of the By-Laws. These Auditors shall examine the accounts and vouchers of the Treasurer and before the adjournment of the meeting shall render a report, and the Academy shall take appropriate action.

CHAPTER VI—PUBLICATIONS.

1. *Publication Committee.* The publications of the Academy are in charge of the Publication Committee.

2. *Distribution.* One copy of each publication shall be sent to every resident member, corresponding member, fellow, honorary member, and patron, while each author shall receive thirty copies of his memoir. This provision shall not be understood as including publications in journals not controlled by the Academy.

3. *Official Organ.* The official organ of the Academy is the "Ohio Journal of Science" under the following terms of agreement:

(a) The Academy shall pay to the "Ohio Journal of Science" one dollar for each subscription sent to members not in arrears for payment of dues.

(b) The "Ohio Journal of Science" shall publish announcements of meetings, lists of publications for sale, etc., whenever the Academy

desires. Such matter, however, may be restricted to one-half page of advertising space in any one issue.

(c) The "Ohio Journal of Science" will print papers of from 300 to 1,500 words presented at the annual meeting provided such papers are submitted in typewritten form within two weeks from the time of adjournment of the meeting, and have been passed upon favorably by the Publication Committee and by the Editor of the "Journal."

4. *Annual Report.* The Annual Report of the Academy, including list of officers, list of members, Secretary's report of the annual meeting, and such other matter as the Publication Committee may determine, shall be printed as a separate issue by the Publication Committee.

5. *Special Papers.* Papers exceeding 1,500 words may be published at the discretion of the publication committee as a part of the series of Special Papers.

6. *Proceedings.* The publication committee shall assemble the Annual Reports and the Special Papers into volumes of proceedings of convenient size, paged consecutively in each volume, under the general title "Proceedings of the Ohio Academy of Science."

7. *Publication of President's Address and Other Addresses.* The President's Address shall be published in the Ohio Journal of Science as soon as possible after the Annual Meeting, and shall not be published in another scientific magazine until it has appeared in the Journal. Other addresses delivered before the Academy on invitation may be published in the Ohio Journal of Science.

CHAPTER VII—RESEARCH FUND.

1. *Sources of Fund.* The Research Fund shall consist of moneys paid by the general public for publications of the Academy, of donations made in the aid of research, and of sums paid in commutation of dues according to By-Laws, Chapter I, Paragraph 1.

2. *Donors.* Donors to this fund, to the sum of twenty-five dollars or more, shall be entitled without charge, to publications subsequently appearing.

3. *Endowment.* The aim of the Academy shall be to accumulate a fund of which the income alone shall be used for the encouragement of research and for the publication of papers bearing upon the development of science in the state.

CHAPTER VIII—ORDER OF BUSINESS.

1. *Annual Meeting.* The order of business at the Annual Meeting shall be as follows:

1. Opening.
 - a. Call to order by the Presiding Officer.
 - b. Statements by the President.
 - c. Appointment by the chair of a committee of three on membership to secure nominations of new members.
 - d. Appointment by the chair of a committee of three on resolutions.
2. Reports of officers.
 - a. Secretary.
 - b. Treasurer.
3. Appointment by the Academy of an Auditing Committee of two members.
4. Reports of Standing Committees.
 - a. Executive Committee.
 - b. Publication Committee.
 - c. Program Committee.
 - d. Trustees of Research Fund.
 - e. Library Committee.
5. Reports of Special Committees.
6. New Business.
7. Election of Nominating Committee.
8. Report of Nominating Committee and Election of Officers.
9. Election of Members.
10. Report of Committee on Resolutions.
11. Report of Auditing Committee.
12. Unfinished Business.
13. Adjournment.

2. *Annual Meeting, Special Rules.* Items of business under 1 to 7 shall be taken up at the first business meeting where possible and be followed by reading of papers. At an adjourned session the order shall be resumed at the place reached on the previous adjournment, but new announcements, motions, and resolutions, shall be in order before the resumption of the business pending.

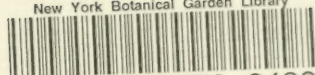
3. *Special or Field Meeting.* At a special meeting or a field meeting items of business under 2, 3, 4, except "a," 7, 8, 11 shall be omitted.

4. *Special or Field Meeting, Special Business.* At any special meeting or field meeting the order of business shall be 1, followed by the special business for which the meeting was called, and this in turn followed by 9, 12, 13, when advisable.

CHAPTER IX—AMENDMENTS.

These By-laws may be amended by a majority of those voting at any annual meeting.

New York Botanical Garden Library



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